Electronic Supplementary Material (ESI) for RSC Advances

Supporting information

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1. Table S1 Crystal data of (1-((3-fluoro-4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15j**))

Crystal Data parameters	**(compound 15j)**
Empirical formula	$C_{18}H_{19}FN_2O_2$
Molecular weight	311.3
Morphology	white transparent crystal
Crystallizing solvent	Dichloromethane and acetonitrile (1:1 ratio)
Crystal size (mm)	0.20x0.15x0.15
Cell Parameters	
a(Å)	8.2658(4)
b(Å)	12.727(7)
c(Å)	12.7267(6)
β(º)	107.505(2)
V (Å^3)	1571.63(13)
Cell measuring reflection	5977
θ-range (º)	2.58-27.04
Crystal system	Monoclinic
Space group	*P*21/c
Z/*Z'*	4/1
Dx(cal.) (g/cm^3)	1.316
μ (mm^{-1})	0.095
Absorption correction	multi-scan
F(000)	652
Data Collection	
Radiation	MoK_α
Temperature (^0K)	295(2)
θ-range (º)	2.1 – 27.3
Index ranges	-10<=*h*<=10
	-18<=*k*<=20
	-15<=*l*<=16
Scan type	*φ* and *ω* scans
Independent reflections	3531
Observed [$I > 2\sigma(I)$]	2398
Refinement	
Final *R* [$F^2 > 2(F^2)$]	0.0588
wR(F^2)_all	0.2014
Goodness-of-fit (*S*)	1.04
$(\Delta/\sigma)_{max}$	0.000
$\Delta\rho_{max}$ and $\Delta\rho_{min}$ (e Å^{-3})	-0.42, 0.47
Data/restraints/ parameter	3531/0/213

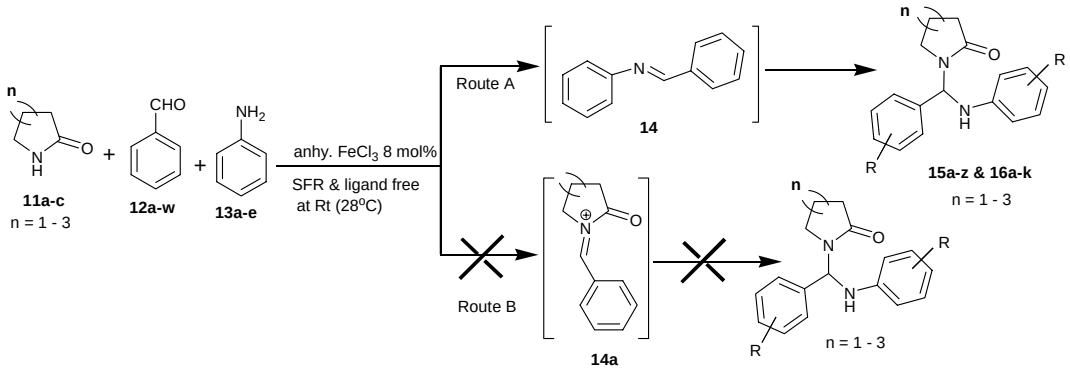
$w = 1/[\sigma^2(F_0^2) + (aP)^2 + bP]$ where $P = (F_o^2 + 2F_c^2)/3$, parameters *a* and *b* are: 0.1161, 0.3673, respectively.

2. Table S2 inter and intra-molecular interactions observed in (1-((3-fluoro-4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15j**))

		Donor (D)	H	Acceptor (A)	D-H (Å)	H…A (Å)	D…A (Å)	Angle(D-H…A) (°)
(15j)	Intra-molecular	C1	H1	O1	0.98	2.50	2.904(2)	104
		C17	H17	N2	0.93	2.48	2.810(3)	101
	Intermolecular	N2	H2	O1^{i}	0.91(4)	2.24(4)	3.152(2)	169(3)
		C4	H4	Cg2^{ii}	0.93	2.72	3.508(3)	142
		C14	F1	Cg1^{iiI}	na	3.522(2)	na	154

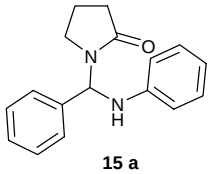
Symmetry codes: (i) x,1/2-y,1/2+z (ii) 1+x,y,z (iii) 1-x,-y,2-z

Scheme 1 Synthesis of N-substituted γ, δ and ε- lactams derivatives



3. Physical data and compound characterization

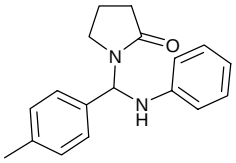
1-(phenyl(phenylamino)methyl)pyrrolidin-2-one (**15a**)



15 a

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford product 15a. **Yield** (1.215 g, 91 %); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); Mp 166-168^oC; FTIR (KBr) cm^{-1} 3367.7$_{(NH)}$, 3340.7, 3113.1, 3057.1, 3034.0, 2947.2, 2891.3, 1660.7$_{(C=O)}$, 1602.8, 1527.6, 1427.3, 1136.0, 873.75, 748.3, 696.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ 7.47 (br-s, 4H), 7.40 (s, 1H), 7.16 (br-s, 2H), 6.79 (br-s, 2H), 6.68-6.64 (t, J = 14Hz, 2H), 6.52 (s, 1H), 3.14 (br-s, 2H $_{\gamma\text{-}CH2}$), 2.384-2.322 (m, 2H $_{\alpha\text{-}CH2}$), 2.12-1.83 (m, 2H$_{\beta\text{-}CH2}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.5$_{(C=O)}$, 146.1, 137.9, 128.9, 128.4, 127.8, 126.3, 117.3, 113.0, 61.8$_{(Chiral\ carbon)}$, 41.8$_{(\gamma\text{-carbon})}$, 30.6$_{(\alpha\text{-carbon})}$, 17.3$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{18}N_2O$ $[M]^+$ 266.1419; found 266.1369.

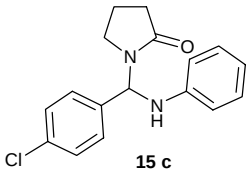
1-((phenylamino)(p-tolyl)methyl)pyrrolidin-2-one (**15b**)



15 b

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford product 15b. **Yield** (1.225g, 87 %); $\mathbf{R_f}$ 0.5 (7:3 *n*-hexane: EtOAc); Mp 155-156^oC; **FTIR** (KBr) cm^{-1} 3305.9$_{(NH)}$, 3122.7, 3051.3, 2974.2, 2939.5, 2916.3, 1664.5$_{(C=O)}$, 1606.7, 1514.1, 1498.6, 1417.6, 1319.3, 1284.5, 1255.6, 1020.3, 748.3, 696.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ 7.25 (s, 2H), 7.81 (s, 2H), 7.06 (s, 2H), 6.69 (s, 2H), 6.58 (s, 1H$_{CH*}$), 6.50 (s, 1H), 6.38 (s, 1H$_{NH}$), 3.03 (br-s, 2H$_{\gamma\text{-}CH2}$), 2.31 (s, 2H$_{\alpha\text{-}CH2}$), 2.25 (s, 3H$_{CH3}$) 1.82 (s, 1H$_{\beta\text{-}CH}$), 1.72 (s, 1H$_{\beta\text{-}CH}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.5$_{(C=O)}$, 146.2, 137.2, 135.0, 129.4, 129.2, 129.1, 129.0, 128.7, 126.3, 121.0, 117.4, 113.1, 61.7$_{(Chiral\ carbon)}$, 41.2$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 20.7$_{(CH3\ carbon)}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O$ $[M]^+$ 280.1576; found 280.1540.

1-((4-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15c**)

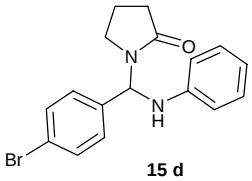


15 c

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford product 15c. **Yield** (1.28g, 85 %); $\mathbf{R_f}$ 0.8 (8:2 *n*-hexane: EtOAc); Mp 157-159^oC; **FTIR** (KBr) cm^{-1} = 3284.7$_{(NH)}$, 3122.7, 3035.9, 2949.1, 2889.3, 1658.7$_{(C=O)}$, 1600.9, 1539.2, 1498.6, 1286.5, 748.3, 690.5; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.51 (br-s, 4H), 7.16 (br-s, 2H), 6.77 (s, 2H), 6.69 (s, 2H), 6.51 (s, 1H), 3.12 (br-s, 2H$_{\gamma\text{-}CH2}$), 2.36-2.31 (d, J = 16.4Hz, 2H$_{\alpha\text{-}CH2}$), 1.98 (s, H$_{\beta}$), 1.84 (s, 1H$_{\beta\text{-}CH2}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 177.2, 174.8$_{(C=O)}$, 146.1, 137.1, 132.6, 129.1, 128.5, 128.4, 117.6,

113.1, 61.4$_{(\text{Chiral carbon})}$, 41.3, 41.2$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 29.9, 20.4, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{17}ClN_2O$
$[M]^+$ 300.1029; found 300.1025.

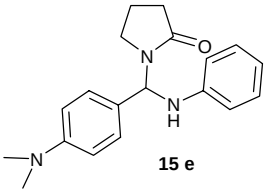
1-((4-bromophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15d**)



15 d

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford product 15d. **Yield** (1.50g, 86 %); $\mathbf{R_f}$ 0.8 (8:2 *n*-hexane: EtOAc); Mp 178-180^{o}C; **FTIR** (KBr) cm^{-1} = 3284.7$_{(NH)}$, 3182.5, 3122.7, 3061.0, 3035.9, 2978.9, 2947.2, 2887.4, 1666.5$_{(C=O)}$, 1600.9, 1539.2, 1431.1, 1286.5, 893.0, 771.5; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.65 (br-s, 2H), 7.43 (br-s, 2H), 7.16 (br-s, 2H), 6.77-6.68 (br-d, *J* = 34Hz, 4H), 6.48 (br-s, 1H), 3.12 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.35-2.31 (br-d, *J* = 16.8Hz, 2H$_{\alpha\text{-CH2}}$), 1.94-1.82 (br-d, *J* = 44.8Hz, 2H$_{\beta\text{-CH2}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.8$_{(C=O)}$, 146.1, 137.5, 131.5, 129.1, 128.8, 121.1, 117.7, 113.2, 61.5$_{(\text{Chiral carbon})}$, 41.3$_{(\gamma\text{-carbon})}$, 30.7$_{(\alpha\text{-carbon})}$, 17.5$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{17}BrN_2O$ $[M]^+$ 344.0524; found 344. 0456.

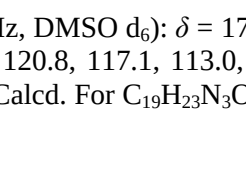
1-((4-(dimethylamino)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15e**)



15 e

The crude, light yellow solid was recrystallized from THF (tetrahydrofuran) and EtOH (ethanol) 1:1 ratio to afford light yellow crystalline needless 15e. **Yield** (1.455g, 94%); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); Mp 166-168^{o}C; **FTIR** (KBr) cm^{-1} = 3303.5$_{(NH)}$, 3128.5, 3057.7, 2978.5, 2937.8, 2918.9, 1668.7$_{(C=O)}$, 1607.8, 1519.4, 1497.4, 1415.9, 1318.3, 1286.5, 1258.9, 1021.3, 747.8, 696.4; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.78-7.77 (d, *J* = 6.8Hz, 1H), 7.40 (br-s, 1H), 7.28-7.26 (d, *J* = 6.4Hz, 2H), 7.22-7.20 (d, *J* = 6Hz, 1H), 7.14 (s, 1H), 6.87-6.79 (br-d, 32Hz, 5H), 6.66 (br-s, 1H), 6.51-6.49 (d, *J* = 7.6Hz, 1H), 6.41-6.39 (d, *J* = 8Hz, 1H), 3.12 (br-s, 2H$_{\gamma\text{-CH2}}$), 3.04 (s, 3H), 2.93 (s, 5H), 2.32-2.26 (br-t, 24.8, 4Hz, 2H$_{\alpha\text{-CH2}}$), 1.90-1.81 (br-d, 34.4Hz, 2H$_{\beta\text{-CH2}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.3$_{(C=O)}$, 159.9, 152.3, 150.1, 146.3, 130.2, 129.0, 128.9, 126.9, 125.2, 124.9, 123.8, 120.8, 117.1, 113.0, 112.2, 111.4, 61.5$_{(\text{Chiral carbon})}$, 41.1$_{(\gamma\text{-carbon})}$, 30.9$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{23}N_3O$
$[M]^+$ 309.1841; found 309.2000.

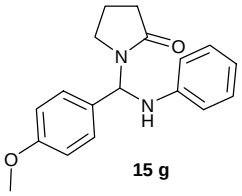
1-((4-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15f**)



15 f

The crude, white solid was recrystallized from THF (tetrahydrofuran) and EtOH (ethanol) 1:1 ratio to afford a white crystalline needless 15f. **Yield** (1.12g, 78%); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); Mp 148-150^{o}C; **FTIR** (KBr) cm^{-1} = 3288.6$_{(NH)}$, 3122.7, 3055.2, 2953.0, 2889.3, 1654.9$_{(C=O)}$, 1604.7, 1508.3, 1498.6, 1224.8, 831.3, 748.3, 690.5; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.51 (br-s, 2H), 7.29 (br-s, 2H), 7.16 (br-s, 2H), 6.78-6.76 (d, *J* = 5.6Hz, 1H), 6.69-6.66 (d, *J* = 8.4Hz, 2H), 6.51-6.49 (d, *J* = 8.8Hz, 1H), 3.13 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.36-2.27 (td, 38.4, 11.6, 4.8Hz, 2H$_{\alpha\text{-CH2}}$), 1.94-1.83 (br-d, 43.6Hz, 2H$_{\beta\text{-CH2}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.7$_{(C=O)}$, 162.9, 160.5, 146.1, 134.2, 134.2, 129.0, 128.5, 128.5, 117.5, 115.4, 115.2, 113.1, 61.4$_{(Chiral\ carbon)}$, 41.2$_{(\gamma\text{-carbon})}$, 30.7$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{17}FN_2O$ [M]$^{+}$ 284.1325; found, 284.1321.

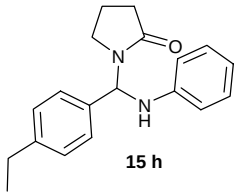
1-((4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15g**)



15 g

The crude, white solid was recrystallized from THF (tetrahydrofuran) and EtOH (ethanol) 1:1 ratio to afford a white crystalline needless 15g. **Yield** (1.32g, 89%); $\mathbf{R_f}$ 0.8 (7.5:2.5 *n*-hexane: EtOAc); Mp 147-149^{o}C; **FTIR** (KBr) cm^{-1} = 3334.9$_{(NH)}$, 3055.2, 3012.8, 2927.9, 2877.7, 2835.3, 1664.5$_{(C=O)}$, 1658.7, 1604.7, 1587.4, 1500.2, 1460.1, 1431.1, 1186.2, 1026.1, 873.7, 746.4, 692.4; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.39-7.38 (d, *J* = 5.2Hz, 2H), 7.15 (br-s, 2H), 7.02-7.01 (d, *J* = 6Hz, 2H), 6.78 (br-s, 2H), 6.68 (br-s, 1H), 6.59-6.57 (d, *J* = 7.2Hz, 1H), 6.46-6.44 (d, *J* = 8Hz, 1H), 3.39 (s, 3H$_{OCH3}$), 3.13 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.35-2.31 (t, *J* = 15.2Hz, 2H$_{\alpha\text{-CH2}}$), 1.92-1.82 (br-d, *J* = 38.8Hz, 2H$_{\beta\text{-CH2}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.4$_{(C=O)}$, 158.9, 146.2. 129.9, 128.9, 127.5, 117.3, 113.8, 113.0, 61.4$_{(Chiral\ carbon)}$, 55.1$_{(OCH3\ carbon)}$, 41.1$_{(\gamma\text{-carbon})}$, 30.7$_{(\alpha\text{-carbon})}$, 17.3$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O_2$ [M]$^{+}$ 296.1525; found, 296.1532.

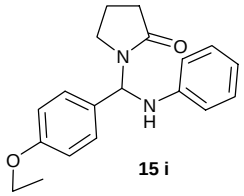
1-((4-ethylphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15h**)



15 h

The crude, white solid was recrystallized from THF (tetrahydrofuran) and EtOH (ethanol) 1:1 ratio to afford a white crystalline needless 15h. **Yield** (1.25g, 85%); $\mathbf{R_f}$ 0.8 (7.5:2.5 *n*-hexane: EtOAc); Mp 113-115^{o}C; **FTIR** (KBr) cm^{-1} = 3302.1$_{(NH)}$, 3118.9, 3034.0, 2962.6, 2927.9, 2887.4, 2872.0, 1658.7$_{(C=O)}$, 1606.7, 1591.2, 1435.0, 1284.5, 756.1; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.37(br-s, 2H), 7.15 (br-s, 2H), 7.00 (br-s, 2H), 6.77 (br-s, 2H), 6.67 (s, 1H), 6.58 (s, 1H), 6.45 (s, 1H), 4.64 (s, 2H$_{CH2proton}$), 3.12 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.32 (br-s, 2H$_{\alpha\text{-CH2}}$), 1.92-1.82 (br-d, 41.6Hz, 2H$_{\beta\text{-CH2}}$), 1.36 (s, 3H$_{CH3proton}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.5$_{(C=O)}$, 158.2, 146.2. 129.8, 129.0, 127.5, 120.9, 117.3, 114.6, 113.1, 63.0$_{(CH2\ carbon)}$ 61.5$_{(Chiral\ carbon)}$, 41.1$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon})}$, 14.6$_{(CH3\ carbon);}$ **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{22}N_2O$ [M]$^{+}$ 294.1732; found 294.1698.

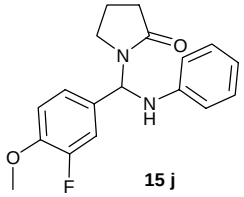
1-((4-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15i**)



15 i

The crude, white solid was recrystallized from THF (tetrahydrofuran) and EtOH (ethanol) 1:1 ratio to afford a white crystalline needless 15i. **Yield** (1.43g, 92%); $\mathbf{R_f}$ 0.9 (7.5:2.5 *n*-hexane: EtOAc); Mp 113-115^{o}C; **FTIR** (KBr) cm^{-1} = 3335.2$_{(NH)}$, 3054.5, 3016.6, 2924.9, 2873.7, 2834.3, 1664.5$_{(C=O)}$, 1605.7, 1582.4, 1505.2, 1460.1, 1431.5, 1186.5, 1028.1, 879.7, 749.4, 693.7;; ^{1}**H NMR** (400 MHz, DMSO d$_6$): δ = 7.38-7.36 (d, *J* = 6.4Hz, 2H), 7.15 (br-s, 2H), 7.00-6.99 (d, *J* = 6.8Hz, 2H), 6.78-6.77 (d, *J* = 6Hz, 2H), 6.68 (s, 2H), 6.59-6.57 (d, *J* = 8.4Hz, 2H), 4.07-4.06 (d, *J* = 3.2Hz, 2H$_{OCH2-CH3}$), 3.10 (br-s, 2H$_{\gamma\text{-}CH2}$), 2.35-2.29 (q, *J* = 16, 7.2Hz, 2H$_{\alpha\text{-}CH2}$), 1.92-1.82 (br-d, 38.8Hz, 2H$_{\beta\text{-}CH2}$); ^{13}**C NMR** (75 MHz, DMSO d$_6$): δ = 174.4$_{(C=O)}$, 158.0, 146.1. 129.6, 128.9, 127.4, 117.2, 114.2, 113.0, 62.9$_{(OCH2\ carbon)}$ 61.4$_{(Chiral\ carbon)}$, 41.0$_{(\gamma\text{-}carbon)}$, 30.7$_{(\alpha\text{-}carbon)}$, 17.3$_{(\beta\text{-}carbon)}$, 14.5$_{(CH3\ carbon);}$ **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{22}N_2O_2$ [M]$^{+}$ 310.1681; found 310.1598.

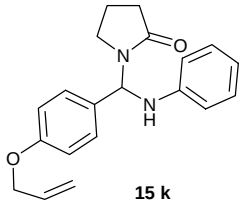
1-((3-fluoro-4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15j**)



15 j

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a white transparent crystal 15j. **Yield** (1.48g, 94%); $\mathbf{R_f}$ 0.8 (7.5:2.5 *n*-hexane: EtOAc); Mp 163-165^{o}C; **FTIR** (KBr) cm^{-1} = 3317.5$_{(NH)}$, 3118.9, 3055.2, 2976.1, 2927.7, 2837.2, 1662.6$_{(C=O)}$, 1602.8, 1514.1, 1502.5, 1458.1, 1319.3, 1265.3, 1220.9, 1112.9, 1028.0, 881.4, 815.8, 756.1, 700.1; ^{1}**H NMR** (400 MHz, DMSO d$_6$): δ = 7.32-7.29 (d, *J* = 12.4Hz, 1H), 7.23 (br-s, 2H), 7.16 (br-s, 2H), 6.78 (br-s, 2H), 6.69 (s, 1H), 6.60 (s, 1H), 6.47-6.45 (d, *J* = 7.2Hz, 1H), 3.88 (s, 3H$_{OCH3}$), 3.21 (br-s, 2H$_{\gamma\text{-}CH2}$), 2.36-2.30 (d, *J* = 24Hz, 2H$_{\alpha\text{-}CH2}$), 1.93-1.82 (d, *J* = 45.2Hz, 2H$_{\beta\text{-}CH2}$); ^{13}**C NMR** (75 MHz, DMSO d$_6$): δ = 174.6$_{(C=O)}$, 152.5, 150.1, 146.8, 146.7, 146.0, 130.9, 130,8, 129.2, 129.0, 122.7, 122.6, 120.9, 177.5, 114.8, 113.9, 113.8, 113.8, 113.2, 61.1$_{(Chiral\ carbon)}$, 56.0$_{(OCH3\ carbon)}$, 41.1$_{(\gamma\text{-}carbon)}$, 30.7$_{(\alpha\text{-}carbon)}$, 17.4$_{(\beta\text{-}carbon);}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{19}FN_2O_2$ [M]$^{+}$ 314.1431; found 314.1420.

1-((4-(allyloxy)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15k**)

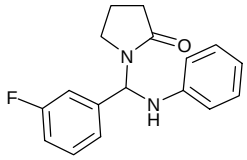


15 k

The crude, white solid was recrystallized from $CHCl_3$ (chloroform) and CH_3CN (acetonitrile) 1:1 ratio to afford a white crystalline needless 15k. **Yield** (1.55g, 96%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); Mp 144-146^{o}C; **FTIR** (KBr) cm^{-1} = 3388.9$_{(NH)}$, 3342.6$_{(NH)}$, 3059.1, 3030.1, 2887.4, 1654.9 $_{(C=O)}$, 1604.7, 1510.2, 1419.6, 1282.6, 1249.8, 1020.3, 933.5, 825.5,746.4, 700.1; ^{1}**H NMR** (400 MHz, DMSO d$_6$): δ = 7.15 (s, 2H), 7.04 (s, 2H), 6.78 (s, 2H), 6.68 (s, 1H), 6.58 (s, 1H), 6.46 (s, 1H), 6.08 (s, 1H), 5.45-5.41 (d, *J* =

17.2Hz, 1H$_{\text{vinylic CH}}$), 5.31-5.28 (d, *J* = 10Hz, 1H$_{\text{vinylic CH}}$), 3.13 (s, 2H$_{\gamma\text{-CH2}}$), 2.33-2.31 (d, *J* = 10.8Hz, 2H$_{\alpha\text{-CH2}}$), 1.930-1.82 (br-d, 42.4Hz, 2H$_{\beta\text{-CH2}}$); **^{13}C NMR** (75 MHz, DMSO d$_6$): δ = 174.5$_{(C=O)}$, 157.8, 146.2, 133.6, 130.0, 128.9, 127.5, 117.4, 117.3, 114.6, 113.0, 68.1$_{(OCH2\ carbon)}$, 61.5$_{(Chiral\ carbon)}$, 41.1$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{20}H_{22}N_2O_2$ [M]$^+$ 322.1681; found, 322.1679.

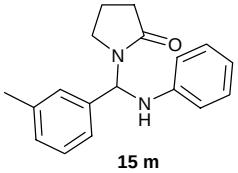
1-((3-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15l**)



15 l

The crude, white solid was recrystallized from $CHCl_3$ (chloroform) and CH_3CN (acetonitrile) 1:1 ratio to afford a white crystalline needless 15l. **Yield** (1.11g, 78%); **R$_f$** 0.7 (7:3 *n*-hexane: EtOAc); Mp 155-157^{o}C; **FTIR** (KBr) cm^{-1} = 3290.5$_{(NH)}$, 3122.7, 3055.2, 2970.3, 2887.4, 1658.7$_{(C=O)}$, 1602.8, 1593.2, 1535.3, 1487.1, 1309.6, 1124.5, 792.7, 750.3, 692.4; **^{1}H NMR** (400 MHz, DMSO d$_6$): δ = 7.51 (br-s, 1H), 7.31-7.17 (m, 5H), 6.79 (s, 2H), 6.70 (s, 2H), 6.54-6.52 (d, *J* = 8.4Hz, 1H), 3.14 (s, 2H$_{\gamma\text{-CH2}}$), 2.40-2.28 (dd, *J* = 38, 15.6, 5.2Hz, 2H$_{\alpha\text{-CH2}}$), 1.96 (s, 1H$_{\beta\text{-CH}}$), 1.83 (s, 1H$_{\beta\text{-CH}}$); **^{13}C NMR** (75 MHz, DMSO d$_6$): δ = 174.8$_{(C=O)}$, 163.5, 161.1, 146.0, 141.0, 140.9, 130.6, 130.6, 129.0, 122.5, 122.5, 117.6, 114.9, 114.7, 113.4, 113.2, 113.2, 61.5, 61.4$_{(Chiral\ carbon)}$, 41.2$_{(\gamma\text{-carbon})}$, 30.6$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{17}FN_2O$ [M]$^+$ 284.1325; found, 284.1321.

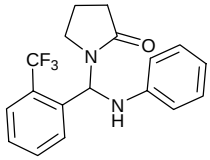
1-((phenylamino)(m-tolyl)methyl)pyrrolidin-2-one (**15m**)



15 m

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a white crystalline needless 15m. **Yield** (1.195g, 85%); **R$_f$** 0.7 (7:3 *n*-hexane: EtOAc); Mp 137-139^{o}C; **FTIR** (KBr) cm^{-1} = 3298.2$_{(NH)}$, 3180.6, 3116.9, 3055.2, 3016.6, 2960.7, 2931.8, 2889.3, 2858.5, 1660.7 $_{(C=O)}$, 1606.7, 1593.2, 1500.6, 1489.0, 758.0, 698.2; **^{1}H NMR** (400 MHz, DMSO d$_6$): δ = 7.45 (br-s, 1H), 7.40-7.16 (m, 5H), 6.79-6.78 (d, *J* = 5.2Hz, 2H), 6.68-6.62 (t, *J* = 24.8Hz, 2H), 6.49-6.47 (d, *J* = 8.4Hz, 1H), 3.14 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.42 (s, 1H), 2.38 (s, 3H$_{CH3\ proton}$), 2.31-2.27 (m, 1H$_{\alpha\text{-CH2}}$), 1.93 (br-s, 1H$_{\beta\text{-CH}}$), 1.827 (br-s, 1H$_{\beta\text{-CH}}$); **^{13}C NMR** (75 MHz, DMSO d$_6$): δ = 174.5$_{(C=O)}$, 160.7, 151.4, 146.2, 138.0, 137.9, 137.7, 135.9, 132.1, 130.4, 129.1, 128.9, 128.8, 128.7, 128.5, 128.4, 126.9, 126.1, 125.9, 123.3, 120.9, 120.8, 117.3, 114.2, 113.0, 61.8$_{(Chiral\ carbon)}$, 41.2$_{(\gamma\text{-carbon})}$, 30.7$_{(\alpha\text{-carbon})}$, 21.1, 20.8$_{(CH3\ carbon)}$, 17.4$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O$ [M]$^+$ 280.1576; found 280.1498.

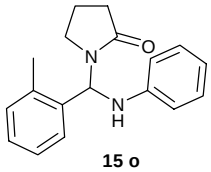
1-((phenylamino)(2-(trifluoromethyl)phenyl)methyl)pyrrolidin-2-one (**15n**)



15 n

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a white transparent crystal 15n. **Yield** (1.45g, 86%); $\mathbf{R_f}$ 0.9 (7:3 *n*-hexane: EtOAc); Mp 156-158^{o}C; **FTIR** (KBr) cm^{-1} = 3307.9 $_{(C=O)}$, 3182.5, 3120.8, 3053.3, 2968.4, 2887.4, 1658.7, 1604.7, 1593.2, 1498.6, 1489.0, 1253.7, 1147.6, 879.5, 750.3, 694.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.51 (br-s, 1H), 7.31-7.17 (m, 5H), 6.79 (br-s, 2H), 6.70 (br-s, 2H), 6.54-6.52 (d, *J* = 8Hz, 1H), 3.14 (s, $2H_{\gamma\text{-}CH2}$), 2.38-2.31 (d, *J* = 27.6Hz, $2H_{\alpha\text{-}CH2}$), 1.96 (s, 1H), 1.83 (s, 1H); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = $174.7_{(C=O)}$, 163.5, 161.4, 146.0, 141.0, 130.6, 130.5, 126.0, 122.5, 122.5, 117.6, 114.8, 113.4, 113.1, $61.4_{(Chiral\ carbon)}$, $41.2_{(\gamma\text{-carbon})}$, $30.6_{(\alpha\text{-carbon})}$, $17.4_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{17}F_3N_2O$ $[M]^+$ 334.1293; found 334.1200.

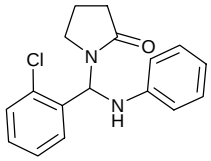
1-((phenylamino)(o-tolyl)methyl)pyrrolidin-2-one (**15o**)



15 o

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a white crystalline needless 15o. **Yield** (1.22g, 87%); $\mathbf{R_f}$ 0.9 (7:3 *n*-hexane: EtOAc); Mp 115-116^{o}C; **FTIR** (KBr) cm^{-1} = $3297.3_{(NH)}$, 3182.5, 3118.1, 3054.8, 3013.4, 2962.4, 2935.3, 2883.8, 2857., 1661.4, 1604.7, 1592.6, 1505.7, 1487.4, 757.7, 697.9; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.43 (s, 1H), 7.27 (s, 3H), 7.14 (s, 2H), 6.69 (s, 3H), 6.51 (s, 1H), 6.45 (s, 1H), 3.28 (s, $2H_{\gamma\text{-}CH2}$), 2.33 (s, 5H CH_3 & α-CH2 protons are merged), 1.98 (s, $1H_{\beta\text{-}CH}$), 1.89 (s, $1H_{\beta\text{-}CH}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = $174.1_{(C=O)}$, 146.4, 136.0, 130.7, 129.0, 128.7, 127.8, 125.8, 125.5, 117.1, 115.5, 113.8, 112.5, $60.6_{(Chiral\ carbon)}$, $42.6_{(\gamma\text{-carbon})}$, $30.8_{(\alpha\text{-carbon})}$, $18.8_{(CH3\ carbon)}$, $17.6_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O$ $[M]^+$ 280.1576; found, 280.1571.

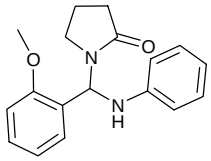
1-((2-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15p**)



15 p

The crude, light reddish brown color liquid 15p; **Yield** (1.09g, 72%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = $3384.8_{(NH)}$, 3152.5, 3038.3, 2987.9, 2899.2, $1668.9_{(C=O)}$, 1606.8, 1567.7, 1499.6, 1289.8, 749.9, 697.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.69-7.31 (m, 3H), 7.21-7.16 (m, 2H),7.03-6.91 (m, 2H), 6.55-6.20 (m, 3H), 5.24-5.12 (m, 1H), 3.18-3.11 (m, $2H_{\gamma\text{-}CH2}$), 2.91-2.88 (d, *J* = 13.2Hz, $1H_{\alpha\text{-}CH}$), 2.76-2.72 (d, *J* = 14Hz, $1H_{\alpha\text{-}CH}$), 2.22 (br-s, $1H_{\beta\text{-}CH}$), 1.98-1.79 (m, $1H_{\beta\text{-}CH}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = $204.6_{(C=O)}$, $196.5_{(C=O)}$, $174.1_{(C=O)}$, 156.3, 151.1, 148.5, 147.2, 147.1, 146.3, 140.6, 140.4, 140.3, 136.8, 136.2, 136.2, 135.0, 132.9, 132.6, 132.5, 132.0, 131.9, 131.8, 131.8, 130.6, 129.8, 128.8, 128.1, 127.9, 127.5, 113.8, 112.5, $60.9_{(Chiral\ carbon)}$, $59.5_{(Chiral\ carbon)}$, $58.7_{(Chiral\ carbon)}$, 52.3, 49.7, 49.6, 49.5, $48.6_{(\gamma\text{-carbon})}$, $48.3_{(\gamma\text{-carbon})}$, $43.1_{(\gamma\text{-carbon})}$, $30.7_{(\alpha\text{-carbon})}$, $29.9_{(\alpha\text{-carbon})}$, $20.4_{(\beta\text{-carbon})}$, $17.7_{(\beta\text{-carbon})}$, $14.0_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{17}ClN_2O$ $[M]^+$ 300.1029; found, 300.1025.

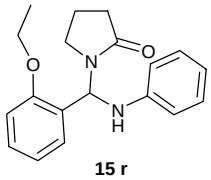
1-((2-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15q**)



15 q

The crude, light brown color liquid 15q; **Yield** (1.208g, 85%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3409.2$_{(NH)}$, 3365.7$_{(NH)}$, 3051.2, 3020.9, 2925.4, 2879.2, 2832.8, 1674.8$_{(C=O)}$, 1665.8 $_{(C=O)}$, 1602.6, 1582.5, 1500.2, 1466.8, 1435.8, 1188.9, 1023.7, 873.7, 742.1, 693.5; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.87 (s, 1H), 8.07 (br-s, 1H), 7.50-7.33 (m, 2H), 7.22-6.99 (5H), 6.742-6.63 (m, 1H), 6.41 (br-s, 1H), 3.79 (s, 3H$_{OCH3}$), 3.30-3.23 (m, 2H $_{\gamma\text{-}CH2}$), 2.26-2.25 (d, J = 4.4Hz, 2H$_{\alpha\text{-}CH2}$), 1.86-1.79 (q, J = 18.2, 6Hz, 2H$_{\beta\text{-}CH2}$) ; ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 189.0$_{(C=O)}$, 173.7$_{(C=O)}$, 159.2, 156.6, 155.5, 152.1, 148.6, 146.6, 133.1, 129.2, 129.1, 128.9, 128.7, 127.6, 127.2, 126.8, 126.6, 125.7, 123.8, 120.8, 120.6, 120.1, 116.9, 115.6, 113.8, 112.7, 112.5, 111.8, 111.3, 58.6, 55.7$_{(CH3\ carbon)}$, 55.6$_{(CH3\ carbon)}$, 55.5$_{(CH3\ carbon)}$, 42.8$_{(\gamma\text{-carbon})}$, 41.3$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 30.5$_{(\alpha\text{-carbon})}$, 29.9$_{(\alpha\text{-carbon})}$, 20.4$_{(\beta\text{-carbon})}$, 17.7$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O_2$ $[M]^+$ 296.1525; found, 296.1524.

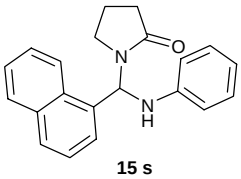
1-((2-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15r**)



15 r

The crude, light brown color liquid 5r; **Yield** (1.32g, 85%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3414.0$_{(NH)}$, 3346.5$_{(NH)}$, 3057.1, 3031.1, 2980.0, 2933.7, 2885.5, 1678.0$_{(C=O)}$, 1660.9 $_{(C=O)}$, 1589.3, 1510.2, 1454.3, 1284.5, 1041.5, 925.8, 752.2, 694.37; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.86 (s, 1H), 8.04 (s, 1H), 7.56-7.31 (m, 2H), 7.21-7.04 (m, 3H), 6.99-6.87 (m, 2H), 6.71-6.60 (m, 1H), 6.495-6.37 (m, 1H), 4.23-4.03 (m, 2H$_{OCH2proton}$), 3.30-3.01 (m, 2H $_{\gamma\text{-}CH2}$), 2.24-1.81 (m, 2H$_{\alpha\text{-}CH2}$), 1.42-1.26 (m, 5H OCH2CH3 protons & β-CH2 protons are merged); ^{13}**C NMR** (75 MHz, DMSO d_6): δ =173.5$_{(C=O)}$, 158.6, 156.0, 155.6, 152.2, 148.6, 146.6, 133.1, 129.2, 128.9, 128.7, 128.6, 127.2, 126.8, 126.6, 125.7, 123.8, 120.7, 120.5, 120.2, 120.0, 116.9, 115.5, 113.8, 112.7, 112.5, 112.3, 63.8$_{(OCH2CH3\text{-}carbon)}$, 63.5$_{(OCH2CH3\text{-}carbon)}$, 58.9$_{(Chiral\ carbon)}$, 42.7$_{(\gamma\text{-carbon})}$, 41.3$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 29.9$_{(\alpha\text{-carbon})}$, 20.4$_{(CH3\ carbon)}$, 17.6$_{(CH3\ carbon)}$, 14.7$_{(OCH2CH3\text{-}carbon)}$, 14.5$_{(OCH2CH3\text{-}carbon)}$, 14.5$_{(OCH2CH3\text{-}carbon)}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{22}N_2O_2$ $[M]^+$ 310.1681; found, 310.1679.

1-(naphthalen-1-yl(phenylamino)methyl)pyrrolidin-2-one (**15s**)

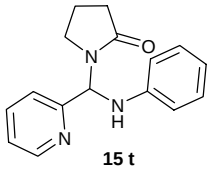


15 s

The crude, light brown color liquid 15s; **Yield** (1.19g, 85%); $\mathbf{R_f}$ 1.0 (8:2 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3417.8 $_{(NH)}$, 3332.9, 3047.5, 2951.0, 2887.4, 1693.5$_{(C=O)}$, 1074.3, 995.2, 881.4; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.19-8.01 (m, 1H), 7.99-7.62 (m, 1H), 7.60-7.38 (m, 3H), 7.28-7.15 (m, 2H), 6.81-6.79 (d, J = 8Hz, 2H), 6.71-6.56 (m, 2H), 3.37-3.31 (q, J = 16.4, 8Hz, 1H $_{\gamma\text{-}CH}$), 3.23-3.31 (q, J = 14.8, 9.2Hz, 1H $_{\gamma\text{-}CH}$), 2.34-2.30 (t, J = 15.6Hz, 2H$_{\alpha\text{-}CH2}$), 2.09-2.05 (t, J = 16Hz, 1H$_{\beta\text{-}CH}$), 1.96-1.85 (m, 1H$_{\beta\text{-}CH2}$);

^{13}C NMR (75 MHz, DMSO d_6): δ = 197.7, 164.3, 177.3, 174.3, 160.5, 151.9, 146.3, 133.7, 133.6, 133.5, 131.9, 130.8, 130.5, 130.5, 129.2, 129.1, 123.6, 123.3, 121.1, 117.3, 115.7, 113.9, 112.7, 60.2$_{(Chiral\ carbon)}$, 54.8$_{(Chiral\ carbon)}$, 42.7$_{(\gamma\text{-carbon})}$, 41.4$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 29.9$_{(\alpha\text{-carbon})}$, 20.4$_{(\beta\text{-carbon})}$, 17.6$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{21}H_{20}N_2O$ [M] $^+$ 316.1576; found, 316.1579.

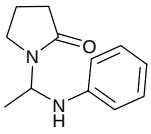
1-((phenylamino)(pyridin-2-yl)methyl)pyrrolidin-2-one (**15t**)



15 t

The crude, white solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a white transparent crystal 14t. **Yield** (0.87g, 65%); **R_f** 1.1 (8:2 *n*-hexane: EtOAc); Mp 141-143^{o}C; **FTIR** (KBr) cm^{-1} = 3321.4, 3053.2, 2953.0, 2877.7, 1685.7, 1600.9, 1570.0, 1517.9, 1431.1, 1257.5, 995.2, 759.9, 744.5, 696.6; **^{1}H NMR** (400 MHz, DMSO d_6): δ = 8.62 (s, 1H), 7.87 (s, 1H), 7.48 (s, 1H), 7.41 (s, 1H), 7.13 (br-s, 2H), 6.79 (br-s, 2H), 6.65 (s, 1H), 6.56 (s, 1H), 6.49 (s, 1H), 3.16 (s, 1H$_{\gamma\text{-CH}}$), 3.08 (s, 1H$_{\gamma\text{-CH}}$), 2.28 (br-s, 2H$_{\alpha\text{-CH2}}$), 1.80-1.76 (t, *J* = 13.2Hz, 2H$_{\beta\text{-CH2}}$) ; **^{13}C NMR** (75 MHz, DMSO d_6): δ = 174.6$_{(C=O)}$, 155.9, 148.8, 148.6, 145.7, 137.5, 129.0, 123.5, 121.9, 117.4, 113.0, 62.5$_{(Chiral\ carbon)}$, 41.4$_{(\gamma\text{-carbon})}$, 30.8$_{(\alpha\text{-carbon})}$, 17.3$_{(\beta\text{-carbon});}$ **HRMS** (EI) *m/z*: Calcd. For $C_{16}H_{17}N_3O$ [M] $^+$ 267.1372; found, 267.1373.

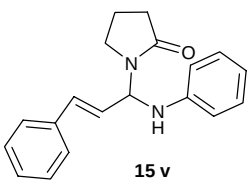
1-(1-(phenylamino)ethyl)pyrrolidin-2-one (**15u**)



15 u

The crude, light brown color liquid 15u; **Yield** (0.595g, 85%); **R_f** 0.9 (8:2 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3383.1$_{(NH)}$, 304, 3047.5, 3018.6, 2956.8, 2922.1, 2850.7, 1672.2$_{(C=O)}$, 1602.5,1502.5, 1379.1, 1155.3, 867.9, 746.4; **^{1}H NMR** (400 MHz, DMSO d_6): δ = 7.15-7.07 (m, 2H), 7.05-6.92 (m, 1H), 6.74-6.69 (t, *J* = 18.8Hz, 1H), 6.61-6.45 (m, 1H), 5.86 (s, 1H), 5.78-5.75 (t, *J* = 15.6Hz, 1H), 3.40(br-s, 2H$_{\gamma\text{-CH2}}$), 2.14-2.12 (d, *J* = 10.4Hz, 1H$_{\alpha\text{-CH}}$), 1.97-1.94 (d, *J* = 12.4Hz, 1H$_{\alpha\text{-CH}}$), 1.47-1.35 (m, 2H$_{\beta\text{-CH2}}$), 1.17-1.16 (t, *J* = 6.4Hz, 3H$_{methyl\ proton}$); **^{13}C NMR** (75 MHz, DMSO d_6): δ = 173.8$_{(C=O)}$, 148.9, 147.9, 145.7, 145.6, 130.3, 128.9, 128.8, 128.7, 127.6, 127.2, 126.5, 122.8, 120.5, 115.4, 115.3, 115.3, 115.2, 113.9, 113.8, 113.2, 112.5, 112.3, 112.2, 48.9$_{(Chiral\ carbon)}$, 47.3$_{(Chiral\ carbon)}$, 46.1$_{(Chiral\ carbon)}$, 41.4$_{(\gamma\text{-carbon})}$, 38.8$_{(\gamma\text{-carbon})}$, 37.1$_{(\gamma\text{-carbon})}$, 34.9$_{(\alpha\text{-carbon})}$, 22.0$_{(\beta\text{-carbon})}$, 21.6$_{(methyl\ carbon)}$; **HRMS** (EI) *m/z*: Calcd. For $C_{12}H_{16}N_2O$ [M] $^+$ 204.1263; found, 204.1266.

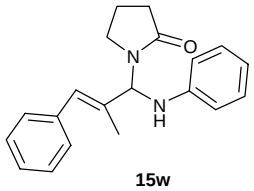
(E)-1-(3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15v**)



15 v

The crude, light brown color liquid 15v; **Yield** (1.03g, 70%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3394.6$_{(NH)}$, 3086.7, 3056.8, 3029.4, 2969.1, 2871.8, 1685.2$_{(C=O)}$, 1600.8, 1496.9, 1453.8, 1242.3, 1025.8, 749.1, 695.0; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.16-8.22 (m, 2H), 7.95-7.51 (m, 3H), 7.37-7.11 (m, 4H), 7.06-7.00 (m, 3H), 6.78-6.04 (m, 2H), 3.66-3.12 (br-s, 2H$_{\gamma\text{-CH2}}$), 2.49-2.033 (m, 2H$_{\alpha\text{-CH2}}$), 1.87 (m, 2H$_{\beta\text{-CH2}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ =174.3, 168.0, 160.6, 151.4, 148.8, 148.6, 147.3, 145.8, 145.6, 144.4, 144.2, 142.3, 137.2, 136.0, 134.6, 131.4, 129.7, 129.2, 128.3, 127.9, 127.2, 127.1, 127.0, 126.6, 125.9, 120.9, 120.7, 119.1, 115.7, 115.6, 114.3, 113.8, 113.1, 112.5, 112.3, 55.8$_{(\text{Chiral carbon})}$, 51.0$_{(\text{Chiral carbon})}$, 49.3$_{(\text{Chiral carbon})}$, 47.2$_{(\gamma\text{-carbon})}$, 35.9$_{(\alpha\text{-carbon})}$, 22.0$_{(\beta\text{-carbon})}$, 21.8$_{(\beta\text{-carbon})}$, 17.4$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{20}N_2O$ $[M]^+$ 292.1576; found, 292.1572

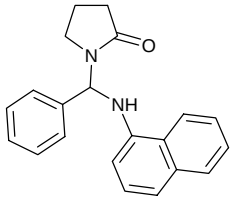
(E)-1-(2-methyl-3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15w**)



15w

The crude, light brown color liquid 15w; **Yield** (1.00g, 65%); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3390.8$_{(NH)}$, 3080.3, 3053.3, 3026.3, 2962.6, 2872.0, 1687.7$_{(C=O)}$, 1602.8, 1494.8, 1452.2, 1249.8, 1020.3, 748.3, 694.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.08 (br-s, 1H), 7.37-6.83 (m, 6H), 6.55-6.25 (m, 5H), 5.75-5.63 (m, 1H), 4.19-3.94 (m, 2H$_{\gamma\text{-CH2}}$), 2.26-1.63 (m, 4H$_{\alpha\text{-CH2 \& }\beta\text{-CH2 peaks are merged with solvent}}$), 0.70-0.471 (m, 3H $_{\alpha\text{-CH3 proton in aldehyde ring}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 197.5, 175.2, 165.1, 151.6, 149.6, 145.5, 141.7, 136.7, 136.1, 130.0, 129.6, 129.5, 129.1, 128.9, 128.7, 128.5, 128.3, 128.2, 127.7, 127.4, 127.1, 126.9, 126.7, 126.3, 125.6, 120.8, 115.7, 115.0, 113.4, 113.1, 112.3, 112.1, 1118.8, 62.2 $_{\text{Chiral carbon}}$, 55.7$_{(\gamma\text{-carbon})}$, 30.7$_{(\alpha\text{-carbon})}$, 30.6$_{(\alpha\text{-carbon})}$, 15.4$_{(\beta\text{-carbon})}$, 12.8$_{(\alpha\text{-CH3 proton in aldehyde ring})}$, 10.5$_{(\alpha\text{-CH3 carbon in aldehyde ring})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{20}H_{22}N_2O$ $[M]^+$ 306.1732 found, 306.1748.

1-((naphthalen-1-ylamino)(phenyl)methyl)pyrrolidin-2-one (**15x**)

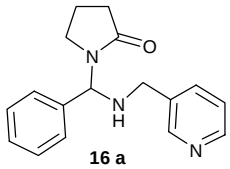


15 x

The crude, light brown solid was recrystallized from DCM (dichloromethane) and CH_3CN (acetonitrile) 1:1 ratio to afford a compound 15x; **Yield** (0.719, 45%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3448.7$_{(NH)}$, 3371 $_{(NH)}$, 3238.4, 3057.1, 3024.3, 2870.0, 1672.2 $_{(C=O)}$, 1624.0, 1598.9, 1284.5, 1267.2, 804.3, 756.1, 698.2; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.67 (br-s, 1H), 8.37-8.36 (m, 2H), 8.05-7.00 (m, 6H), 6.85-6.56 (m, 3H), 3.20 (br-s, 2H $_{\gamma\text{-CH2 protons are merged with solvent peak}}$), 2.35 (br-s, 1H$_{\alpha\text{-CH proton are merged with solvent peak}}$), 1.98 (m, 1H$_{\alpha\text{-CH proton}}$), 1,22-1.17 (m, 1H$_{\beta\text{-CH}}$), 0.844 (br-s, 1H$_{\beta\text{-CH}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 179.2, 160.6, 143.8, 136.1, 131.9, 131.5, 129.4, 128.8, 128.6, 128.3, 128.1, 127.7, 126.7,

126.5, 126.2, 125.8, 125.6, 125.4, 112.2, 107.4, 106.7, 59.7$_{(Chiral\ carbon)}$, 42.4$_{(\gamma\text{-carbon})}$, 31.1$_{(\alpha\text{-carbon})}$, 17.5$_{(\beta\text{-carbon})}$, 14.07$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{21}H_{20}N_2O$ $[M]^+$ 316.1576; found, 316.1569.

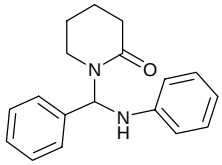
1-(phenyl(pyridine-3-ylmethylamino)methyl)pyrrolidin-2-one (**16a**)



16 a

The crude, light brown color liquid 16a; **Yield** (0.775, 55%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3392.7$_{(NH)}$, 3273.2$_{(NH)}$, 3084.1, 3059.1, 3028.2, 2997.3, 2875.8, 2843.0, 1681.9$_{(C=O)}$, 1643.3$_{(C=O)}$, 1577.7, 1477.4, 1423.4, 1309.6, 1026.1, 788.8, 756.1, 694.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.55 (br-s, 3H), 7.80 (br-s, 4H), 7.47 (br-s, 4H), 4.81 (br-s, 2H$_{benzyl\ CH2}$), 3.746 (br-s, 4H $_{both\ \gamma\text{-CH2}\ \&\ \alpha\text{-CH2}\ protons\ were\ merged\ with\ solvent\ peak}$), 2.32 (br-s, 1H$_{\beta\text{-CH}}$), 1.82 (br-s, 1H$_{\beta\text{-CH}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 174.7, 162.4, 149.5, 149.1, 148.1, 138.9, 135.8, 135.5, 135.1, 130.8, 128.6, 128.3, 128.0, 127.6, 126.5, 123.5, 123.2, 66.2 $_{(benzyl\ CH2\ group)}$, 61.6$_{(Chiral\ carbon)}$, 46.6$_{(\gamma\text{-carbon})}$, 30.9$_{(\alpha\text{-carbon})}$, 17.4$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{17}H_{19}N_3O$ $[M]^+$ 281.1528; found 281.1523.

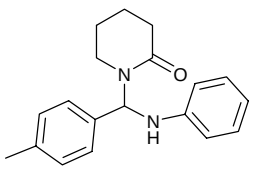
1-(phenyl(phenylamino)methyl)piperidin-2-one (**16b**)



16 b

The crude, white solid was recrystallized from DCM and CH_3CN (acetonitrile) 1:1 ratio to afford a white solid 16b. **Yield** (0.855g, 60%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3334.9,$_{(NH)}$, 3120.8, 3059.1, 2953.0, 2868.1, 1660.7, 1602.8, 1500.6, 1487.1, 1301.9, 1280.7, 1128.3, 1029.9, 979.8, 752.2, 694.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.63 (s, 1H), 7.96 (s, 1H), 7.62-7.54 (m, 1H), 7.36 (br-s, 4H), 7.28-7.27 (d, *J* = 5.2Hz, 1H), 7.15-7.08 (m, 2H), 6.77-6.70 (m, 1H), 6.72-6.67 (m, 1H), 3.11 (s, 1H $_{\delta\text{-CH proton}}$), 2.99-2.95 (d, *J* = 12.8Hz, 1H $_{\delta\text{-CH proton}}$), 2,43-2.31 (q, *J* = 30.6, 17.2Hz, 1H $_{\alpha\text{-CH proton}}$), 2.12 (s, 1H $_{\alpha\text{-CH proton}}$), 1.67-1.51 (m, 4H $_{\beta\ \&\ \gamma\ CH2\ respectively)}$; ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 170.0$_{(C=O)}$, 169.5$_{(C=O)}$, 160.7, 151.4, 148.5, 146.2, 138.1, 135.9, 131.4, 129.4, 129.1, 129.0, 128.8, 128.7, 128.6, 128.5, 127.7, 126.4, 125.9, 120.9, 117.3, 115.5, 113.8, 113.0, 62.8$_{(Chiral\ carbon)}$, 41.2$_{(\delta\text{-carbon})}$, 31.8$_{(\alpha\text{-carbon})}$, 22.2$_{(\beta\text{-carbon})}$, 20.4$_{(\gamma\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{20}N_2O$ $[M]^+$ 280.1576; found, 280.1572.

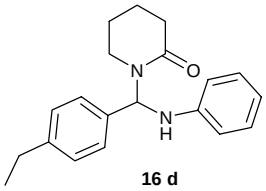
1-((phenylamino)(p-tolyl)methyl)piperidin-2-one (**16c**)



16 c

The crude, light brown color liquid 16d; **Yield** (0.77g, 52%); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3300.2$_{(NH)}$, 3230.7$_{(NH)}$, 3057.1, 3028.2, 2947.2, 2872.0, 1701.2$_{(C=O)}$, 1666.5$_{(C=O)}$, 1624.0, 1608.6, 1589.3, 1571.9, 1485.1, 1307.7, 1170.7, 977.9, 877.6, 815.8, 754.1, 694.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.53 (s, 1H), 7.84-7.78 (m, 2H), 7.42-7.29 (m, 4H), 7.27-7.21 (m, 2H), 6.86-6.62 (m, 1H), 3.11-3.10 (d, J = 5.2Hz, 2H$_{\delta\text{-CH2 proton}}$), 2.35-2.24 (m, 4H$_{\alpha\text{-CH2 \& }\beta\text{-CH2 protons are merged}}$), 1.62-1.57 (p, J = 17.6, 8.8, 5.6Hz, 5H$_{\gamma\text{ CH2 \& CH3 protons are merged together}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 192.3$_{(C=O)}$, 160.2, 151.6, 148.6, 145.1, 141.4, 136.8, 133.9, 133.5, 129.5, 129.3, 129.1, 128.7, 128.7, 128.6, 128.6, 125.7, 120.9, 115.7, 113.9, 113.1, 62.6$_{(Chiral\ carbon)}$, 60.4$_{(Chiral\ carbon)}$, 41.2$_{(\delta\text{-carbon})}$, 31.8$_{(\alpha\text{-carbon})}$, 31.4$_{(\alpha\text{-carbon})}$, 22.2$_{(\beta\text{-carbon})}$, 22.0$_{(\beta\text{-carbon})}$, 21.3$_{(\gamma\text{-carbon})}$, 21.1$_{(\gamma\text{-carbon})}$, 20.7$_{(CH3\text{-proton})}$, 20.4$_{(CH3\text{-proton})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{22}N_2O$ $[M]^+$ 294.1732; found, 294.1739.

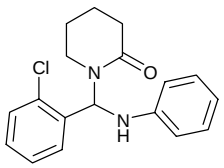
1-((4-ethylphenyl)(phenylamino)methyl)piperidin-2-one (**16d**)



16 d

The crude, light brown color liquid 16e; **Yield** (0.945, 61%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3408.2$_{(NH)}$, 3214.3$_{(NH)}$, 3049.4, 3020.5, 2964.5, 2929.8, 2872.0, 1689.6$_{(C=O)}$, 1680.0$_{(C=O)}$, 1600.9, 1568.1, 1492.9, 1311.5, 1172.7, 1112.9, 831.3, 748.3, 692.4; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.58 (s, 1H), 7.88 (s, 2H), 7.42-7.04 (m, 6H), 6.82-6.40 (m, 2H), 3.47 (br-s, $_{\text{ethyl CH2 proton merged with solvent peak}}$), 3.12 (br-s, 1H$_{\delta\text{-CH proton}}$), 2.66 (br-s, 2H4H$_{\alpha\text{-CH2 proton}}$), 2.14 (br-s, 1H$_{\delta\text{-CH proton}}$), 1.62 (br-s, 2H$_{\beta\text{-CH2}}$), 1.02-1.16 (m, 5H2H$_{\gamma\text{ CH2 \& CH3 protons are merged together}}$) ; ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 192.5$_{(C=O)}$, 170.1$_{(C=O)}$, 167.3, 160.3, 160.0, 151.6, 150.2, 149.0, 148.5, 148.1, 147.9, 147.9, 147.6, 147.5, 146.9, 146.7, 142.2, 141.7, 141.5, 141.3, 140.8, 133.7, 129.4, 129.1, 128.7, 127.7, 127.5, 127.2, 125.7, 120.9, 120.9, 116.0, 115.6, 113.9, 113.2, 60.4$_{(Chiral\ carbon)}$, 60.3$_{(Chiral\ carbon)}$, 41.2$_{(\delta\text{-carbon})}$, 31.4$_{(\alpha\text{-carbon})}$, 28.2$_{(\beta\text{-carbon})}$, 27.7$_{(\beta\text{-carbon})}$, 22.0$_{(\gamma\text{-carbon})}$, 20.7$_{(\gamma\text{-carbon})}$, 15.5$_{(CH3\text{-proton})}$, 15.2$_{(CH3\text{-proton})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{20}H_{24}N_2O$ $[M]^+$ 308.1889; found, 308.1890.

1-((2-chlorophenyl)(phenylamino)methyl)piperidin-2-one (**16e**)

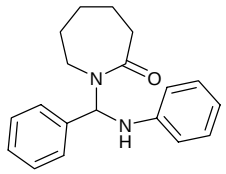


16 e

The crude, light brown color liquid 16f; **Yield** (0.901, 57%); $\mathbf{R_f}$ 0.9 (8:2 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3403.9$_{(NH)}$, 3328.2$_{(NH)}$, 3056.9, 3028.4, 2926.2, 2856.3, 1653.2$_{(C=O)}$, 1625.2$_{(C=O)}$, 1583.6, 1442.8, 1305.9, 1271.8, 1128.8, 942.7, 878.2, 752.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.90-8.89 (d, J = 1.6Hz, 1H), 8.22-8.18 (t, J = 15.2Hz, 1H), 7.83-7.31 (m, 5H), 7.01-6.78 (m, 2H), 6.66-6.52 (m, 2H), 3.14 (br-s, 2H$_{\delta\text{-CH proton}}$), 2.15-2.11 (m, 2H$_{\alpha\text{-CH2 proton}}$), 1.66-1.63 (m, 4H $_{\beta\text{-CH2\& }\gamma\text{ CH2 \& protons are merged together}}$); ^{13}**C**

NMR (75 MHz, DMSO d_6): δ = 196.5$_{(C=O)}$, 170.1$_{(C=O)}$, 166.7, 156.3, 156.3, 151.1, 150.2, 147.5, 147.4, 146.7, 145.1, 140.6, 139.9, 139.5, 137.8, 136.8, 135.0, 132.9, 132.5, 130.8, 130.5, 130.0, 129.3, 128.9, 128.8, 128.6, 128.3, 128.0, 127.6, 121.1, 121.0, 118.1, 116.4, 116.0, 115.7, 115.2, 112.8, 112.7, 112.6, 112.3, 57.2$_{(Chiral\ carbon)}$, 57.2$_{(Chiral\ carbon)}$, 54.9$_{(Chiral\ carbon)}$, 41.2$_{(\delta\text{-carbon})}$, 31.4$_{(\alpha\text{-carbon})}$, 30.6$_{(\beta\text{-carbon})}$, 22.0$_{(\gamma\text{-carbon})}$, 20.7$_{(\gamma\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{18}H_{19}ClN_2O$ $[M]^+$ 314.1186; found, 314.1182.

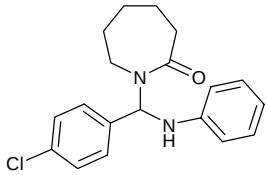
1-(phenyl(phenylamino)methyl)azepan-2-one (**16f**)



16 f

The crude, white solid was recrystallized from DCM and CH_3CN (acetonitrile) 1:1 ratio to afford a white solid 16g. **Yield** (0.771g, 52%); $\mathbf{R_f}$ 1.0 (8:2 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = 3319.4$_{(NH)}$, 3120.8, 3059.1, 3035.9, 2935.6, 2922.1, 2854.6, 1618.2$_{(C=O)}$, 1606.7, 1504.4, 1328.9, 1126.4, 970.1, 879.5, 752.2; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 7.43-7.42 (d, *J* = 5.6Hz, 3H), 7.40 (br-s, 2H), 7.16-7.13 (t, *J* = 14.8Hz, 2H), 7.00-6.97 (d, *J* = 9.6Hz, 1H), 6.80-6.75 (t, 18.4Hz, 3H), 6.67-6.63 (t, *J* = 14.4Hz, 1H), 3,28-3.16 (m, 2H$_{\varepsilon\text{-CH2}}$), 2.70-2.63 (t, *J* = 24.8Hz, 1H$_{\alpha\text{-CH}}$), 2.45-2.40 (m, 1H $_{\alpha\text{-CH}}$), 1.64-1.55 (m, 2H$_{\beta\text{-CH2}}$), 1.45-1.24 (m, 3H $_{\delta\text{-CH2 and }\gamma\text{-CH protons are merged}}$), 0.98-0.904 (q, *J* = 21Hz, 9.6Hz. 1H $_{\gamma\text{-CH}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 175.6, 146.5, 138.7, 128.9, 128.3, 127.6, 126.5, 117.2, 113.0, 63.6$_{(Chiral\ carbon)}$, 42.1$_{(\varepsilon\text{-carbon})}$, 37.1$_{(\alpha\text{-carbon})}$, 29.2$_{(\gamma\text{-carbon})}$, 27.9$_{(\delta\text{-carbon})}$, 23.0$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{22}N_2O$ $[M]^+$ 294.1732; found, 294.1732.

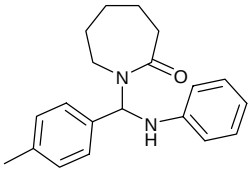
1-((4-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16g**)



16 g

The crude, light brown color liquid 16h; **Yield** (1.02g, 62%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} =3410.1$_{(NH)}$, 3307.9$_{(NH)}$, 3053.3, 3028.2, 2929.8, 2856.5, 1701.2$_{(C=O)}$, 1662.2$_{(C=O)}$, 1589.3, 1568.1, 1489.0, 1313.5, 1259.5, 1190.0, 1087.8, 975.9, 825.9, 763.8, 750.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.60 (br-s, 1H), 7.95 (br-s 2H), 7.53-7.07 (m, 6H), 6.71 (br-s, 2H), 3.04 (br-s, 2H$_{\varepsilon\text{-CH2}}$), 2.30 (br-s 2H$_{\alpha\text{-CH2}}$), 1.60 (br-s, 2H$_{\beta\text{-CH2}}$), 1.50 (br-s, 4H $_{\delta\text{-CH2 and }\gamma\text{-CH2 protons are merged together}}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = 197.8, 177.0, 159.2, 151.1, 149.9, 147.6, 142.4, 141.0, 139.4, 136.1, 134.8, 131.5, 131.5, 131.0, 129.1, 128.8, 128.3, 128.2, 126.1, 121.1, 121.0, 116.3, 113.3, 113.1, 59.9$_{(Chiral\ carbon)}$, 41.5$_{(\varepsilon\text{-carbon})}$, 36.4$_{(\alpha\text{-carbon})}$, 30.0$_{(\gamma\text{-carbon})}$, 29.8$_{(\delta\text{-carbon})}$, 22.9$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{21}ClN_2O$ $[M]^+$ 328.1342; found, 328.1345.

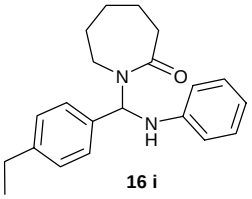
1-((phenylamino)(p-tolyl)methyl)azepan-2-one (**16h**)



16 h

The crude, light brown color liquid 16i; **Yield** (1.13g, 73%); $\mathbf{R_f}$ 0.8 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = $3388.9_{(NH)}$, $3305.9_{(NH)}$, 3078.3, 3051.3, 3028.2, 2927.9, 2883.5, 2856.5, $1703.1_{(C=O)}$, $1660.7_{(C=O)}$, 1602.8, 1589.3, 1571.9, 1500.6, 1413.8, 1309.6, 1286.5, 1172.7, 979.8, 877.6, 815.8, 752.2; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.55 (br-s, 1H), 7.84 (br-s, 2H), 7.40-7.05 (m, 6H), 6.66-6.56 (m, 2H), 3.04 (br-s, $2H_{\varepsilon\text{-}CH2}$), 2.36 (br-s, $4H_{\alpha\text{-}CH2 \text{ and } \beta\text{-}CH2 \text{ protons are merged together}}$), 1.62 (br-s, $2H_{\delta\text{-}CH2}$), 1.50 (br-s, $2H_{\gamma\text{-}CH2}$); ^{13}**C NMR** (75 MHz, DMSO d_6): δ = $192.4_{(C=O)}$, $177.0_{(C=O)}$, 160.3, 151.5, 150.2, 147.9, 147.7, 145.1, 141.4, 135.8, 133.5, 129.3, 129.1, 128.6, 128.0, 127.2, 125.7, 120.9, 116.2, 114.3, 113.2, $60.3_{(Chiral\ carbon)}$, $41.4_{(\varepsilon\text{-}carbon)}$, $38.8_{(\alpha\text{-}carbon)}$, $36.4_{(\gamma\text{-}carbon)}$, $29.9_{(\delta\text{-}carbon)}$, $29.7_{(\delta\text{-}carbon)}$, $22.9_{(\beta\text{-}carbon)}$, $21.1_{(\beta\text{-}carbon)}$, $20.5_{(\beta\text{-}carbon)}$; **HRMS** (EI) *m/z*: Calcd. For $C_{20}H_{24}N_2O$ $[M]^+$ 308.1889; found, 308.1885.

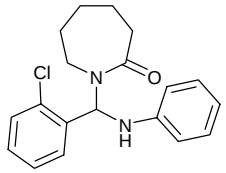
1-((4-ethylphenyl)(phenylamino)methyl)azepan-2-one (**16i**)



16 i

The crude, light brown color liquid 16j; **Yield** (1.10g, 68%); $\mathbf{R_f}$ 0.7 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = $3300.2_{(NH)}$, $3232.7_{(NH)}$, 3049.4, 3024.3, 2964.5, 2929.8, 2858.5, $1658.7_{(C=O)}$, $1631.7_{(C=O)}$, 1598.9, 1568.1, 1500.6, 1417.6, 1282.6, 1174.6, 1082.9, 979.8, 831.3, 748.3; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.57 (s, 1H), 7.87-7.72 (m, 6H), 6.80-6.13 (m, 2H), 3.04 (s, $2H_{\varepsilon\text{-}CH2}$), 2.65 (br-s, $2H_{\alpha\text{-}CH}$), 2.29 (br-s, $2H_{\beta\text{-}CH2}$), 1.63-1.50 (m, $2H_{\delta\text{-}CH2}$), 1.19 (br-s, $2H_{\gamma\text{-}CH2}$); **HRMS** (EI) *m/z*: Calcd. For $C_{21}H_{26}N_2O$ $[M]^+$ 322.2045; found, 322.2050.

1-((2-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16j**)



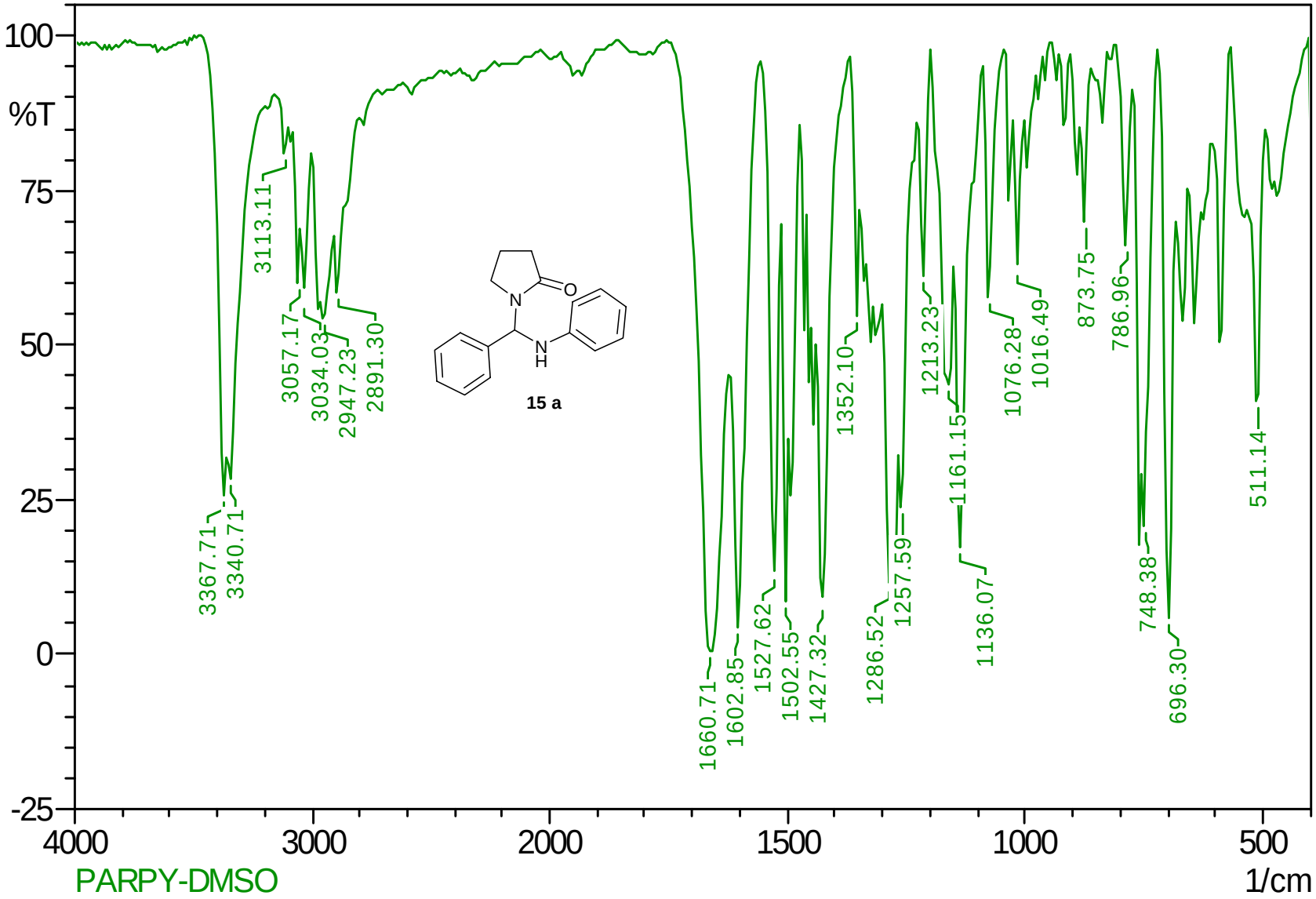
16 j

The crude, light brown color liquid 16k; **Yield** (0.925g, 56%); $\mathbf{R_f}$ 0.9 (7:3 *n*-hexane: EtOAc); **FTIR** (KBr) cm^{-1} = $3412.0_{(NH)}$, $3321.4_{(NH)}$, 3057.1, 3026.3, 2927.9, 2854.6, $1658.7_{(C=O)}$, $1627.9_{(C=O)}$, 1587.2, 1442.7, 1309.6, 1273.0, 1122.5, 947.7, 874.2, 754.1; ^{1}**H NMR** (400 MHz, DMSO d_6): δ = 8.86 (br-s, 1H), 8.17 (br-s, 1H), 7.55-7.44 (m, 2H), 7.29-7.02 (m, 4H), 6.55 (br-s, 2H), 5.94 (br-s, 1H), 3.04 (br-s, $2H_{\varepsilon\text{-}CH2}$), 2.29 (br-s, $2H_{\alpha\text{-}CH2}$), 1.63 (br-s, $2H_{\beta\text{-}CH2}$), 1.50 (br-s, $4H_{\delta\text{-}CH2 \text{ and } \gamma\text{-}CH2 \text{ protons are merged together}}$) ; ^{13}**C NMR** (75

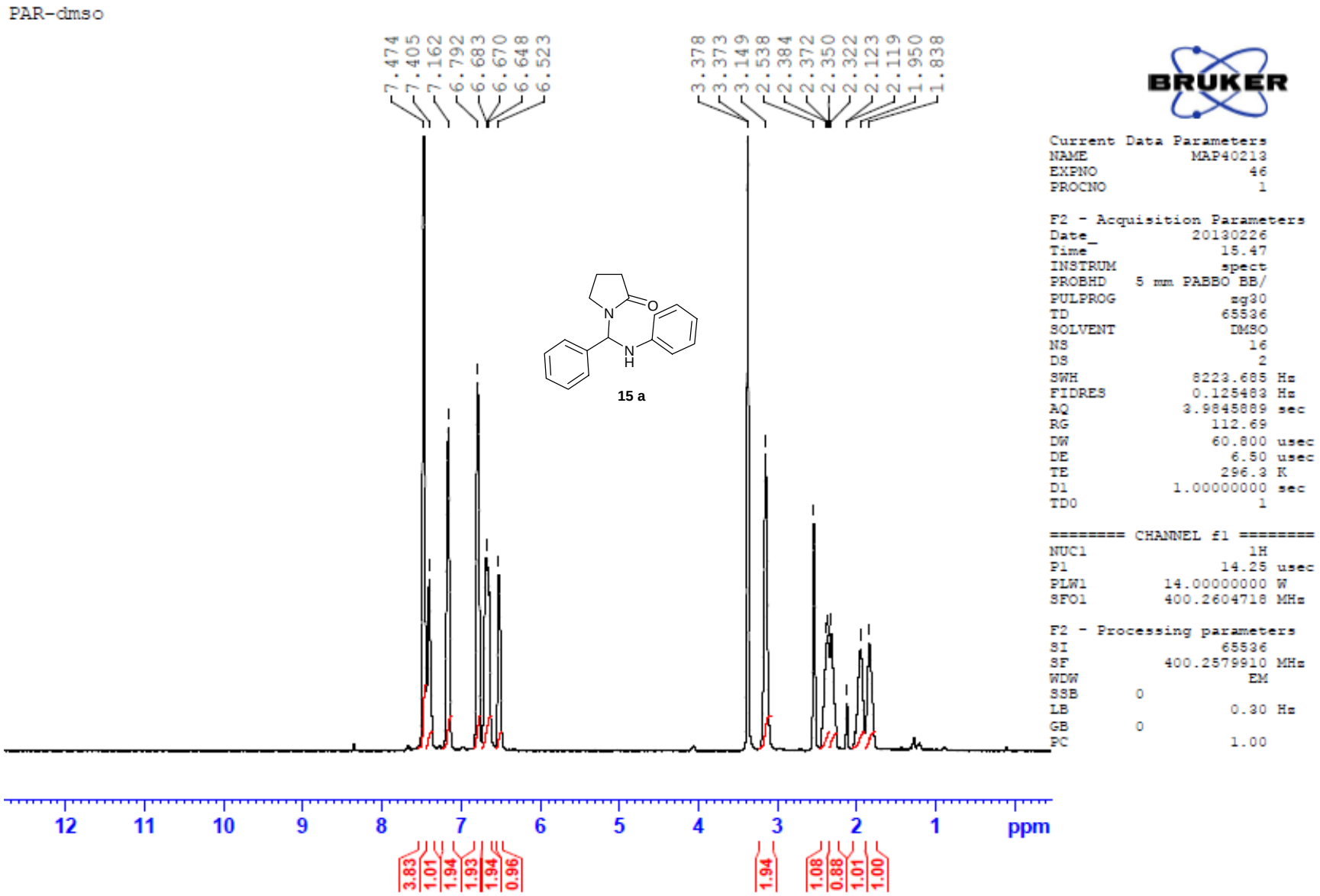
MHz, DMSO d_6): δ = 190.1, 176.9, 156.3, 151.1, 150.2, 147.5, 147.4, 139.9, 139.5, 135.0, 132.9, 132.5, 130.0, 129.3, 128.8, 128.6, 128.3, 127.6, 126.5, 121.1, 121.0, 112.8, 112.6, 57.3$_{(\text{Chiral carbon})}$, 41.4$_{(\varepsilon\text{-carbon})}$, 36.3$_{(\alpha\text{-carbon})}$, 29.9$_{(\gamma\text{-carbon})}$, 29.7$_{(\delta\text{-carbon})}$, 22.9$_{(\beta\text{-carbon})}$; **HRMS** (EI) *m/z*: Calcd. For $C_{19}H_{21}ClN_2O$ $[M]^+$ 328.1342; found, 328.1347.

4. IR, ^{1}H NMR & ^{13}C NMR spectra's for synthesized compounds

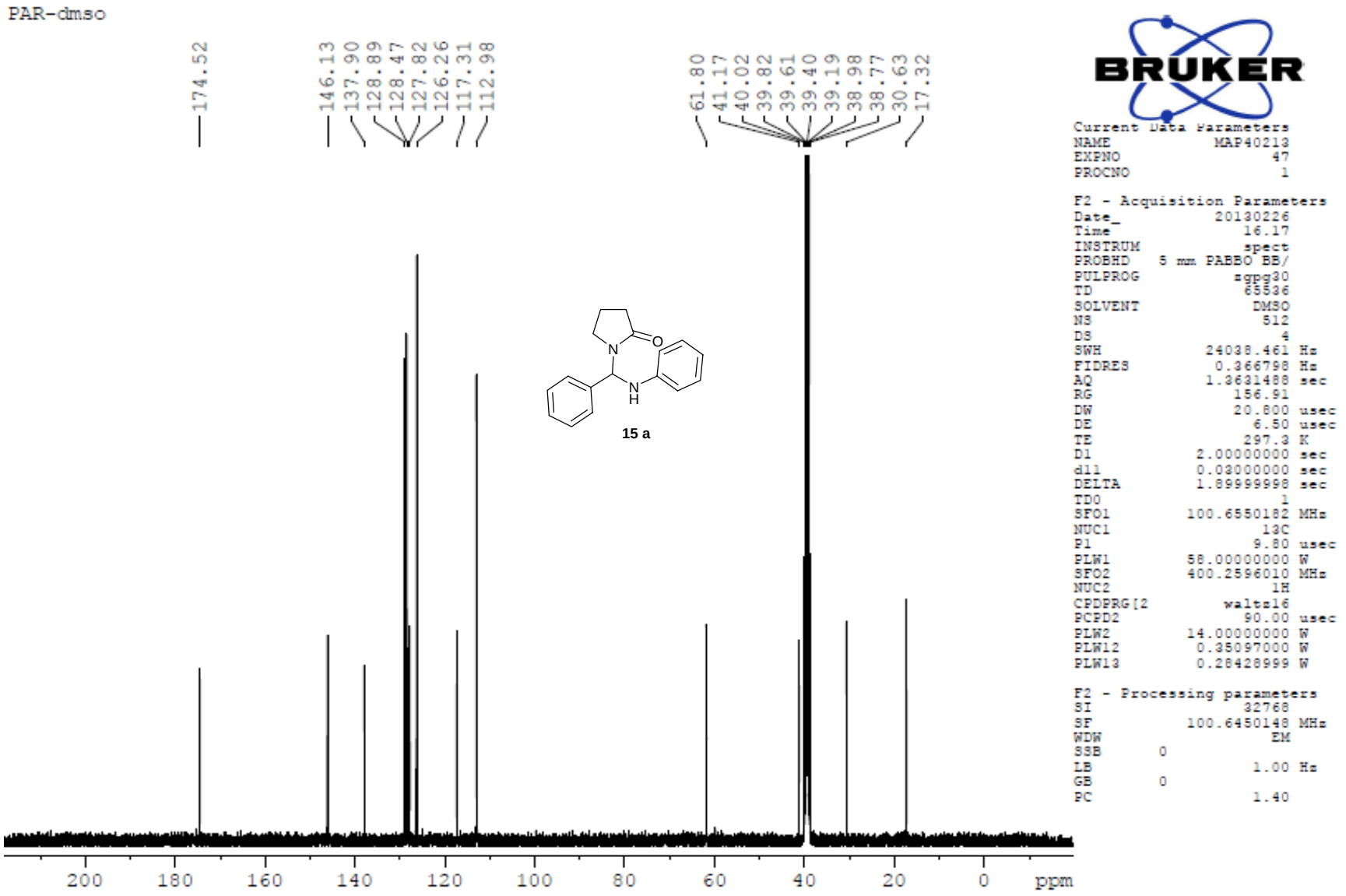
IR Spectrum of - 1-(phenyl(phenylamino)methyl)pyrrolidin-2-one (**15a**)



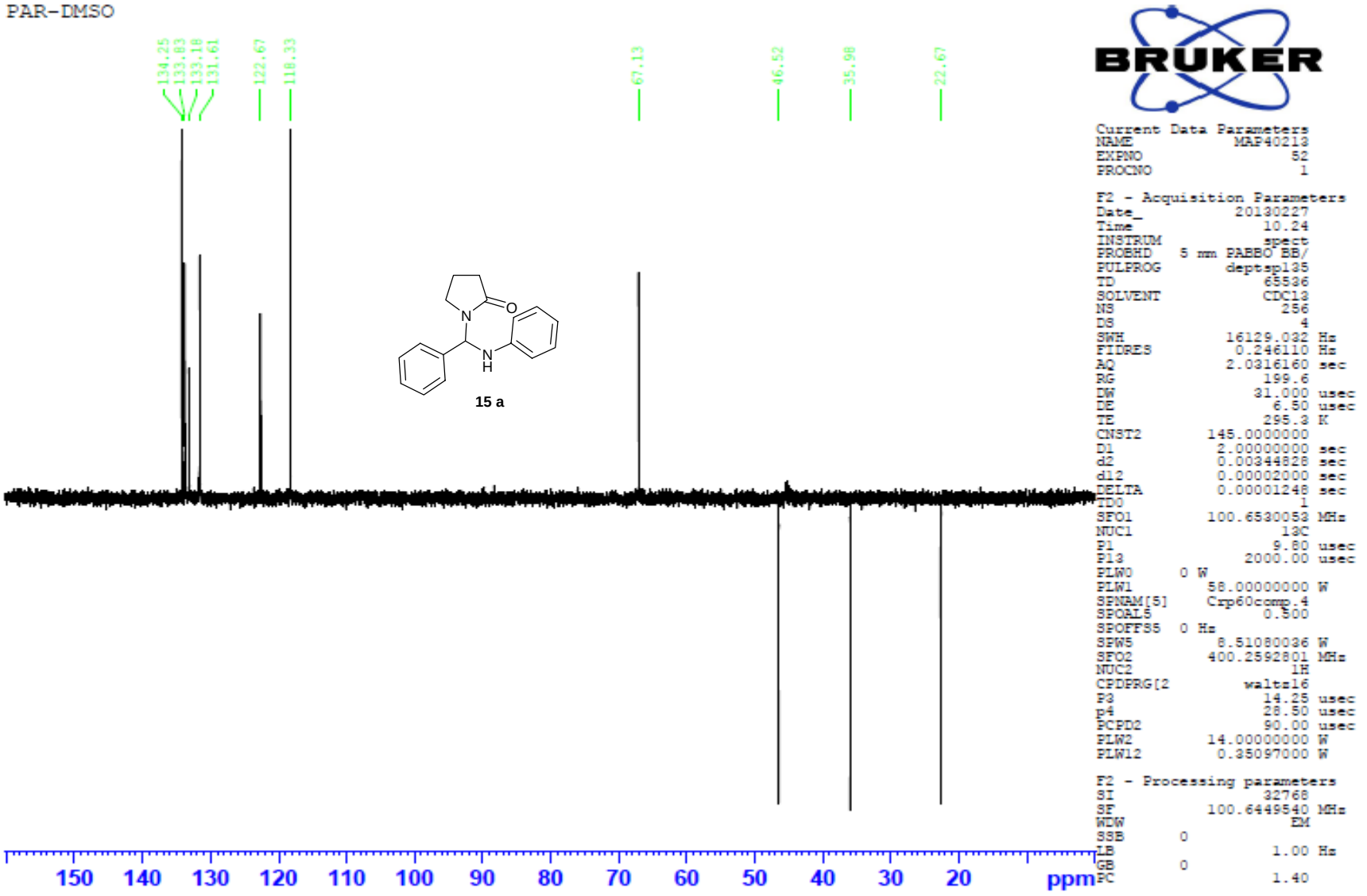
^{1}H NMR- 1-(phenyl(phenylamino)methyl)pyrrolidin-2-one (**15a**)



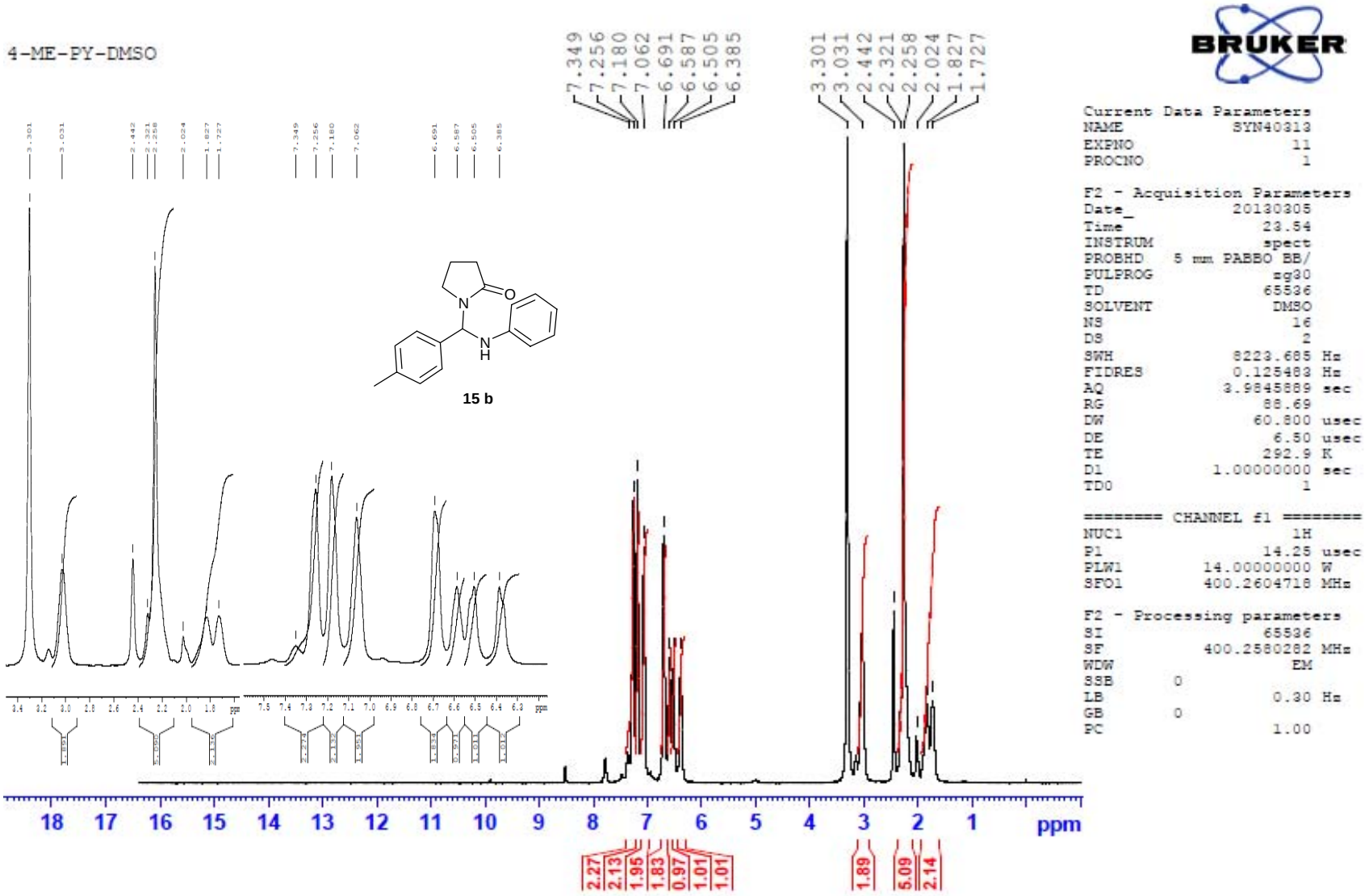
C^{13} NMR- 1-(phenyl(phenylamino)methyl)pyrrolidin-2-one (**15a**)



DEPT 135- NMR- 1-(phenyl(phenylamino)methyl)pyrrolidin-2-one (**15a**)



^{1}H NMR- 1-((phenylamino)(p-tolyl)methyl)pyrrolidin-2-one (**15b**)

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PROCNO                       1

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PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845689 sec
RG                      88.69
DW                     60.800 usec
DE                      6.50 usec
TE                     292.9 K
D1                1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.25 usec
PLW1             14.00000000 W
SFO1             400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF               400.2580282 MHz
WDW                        EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
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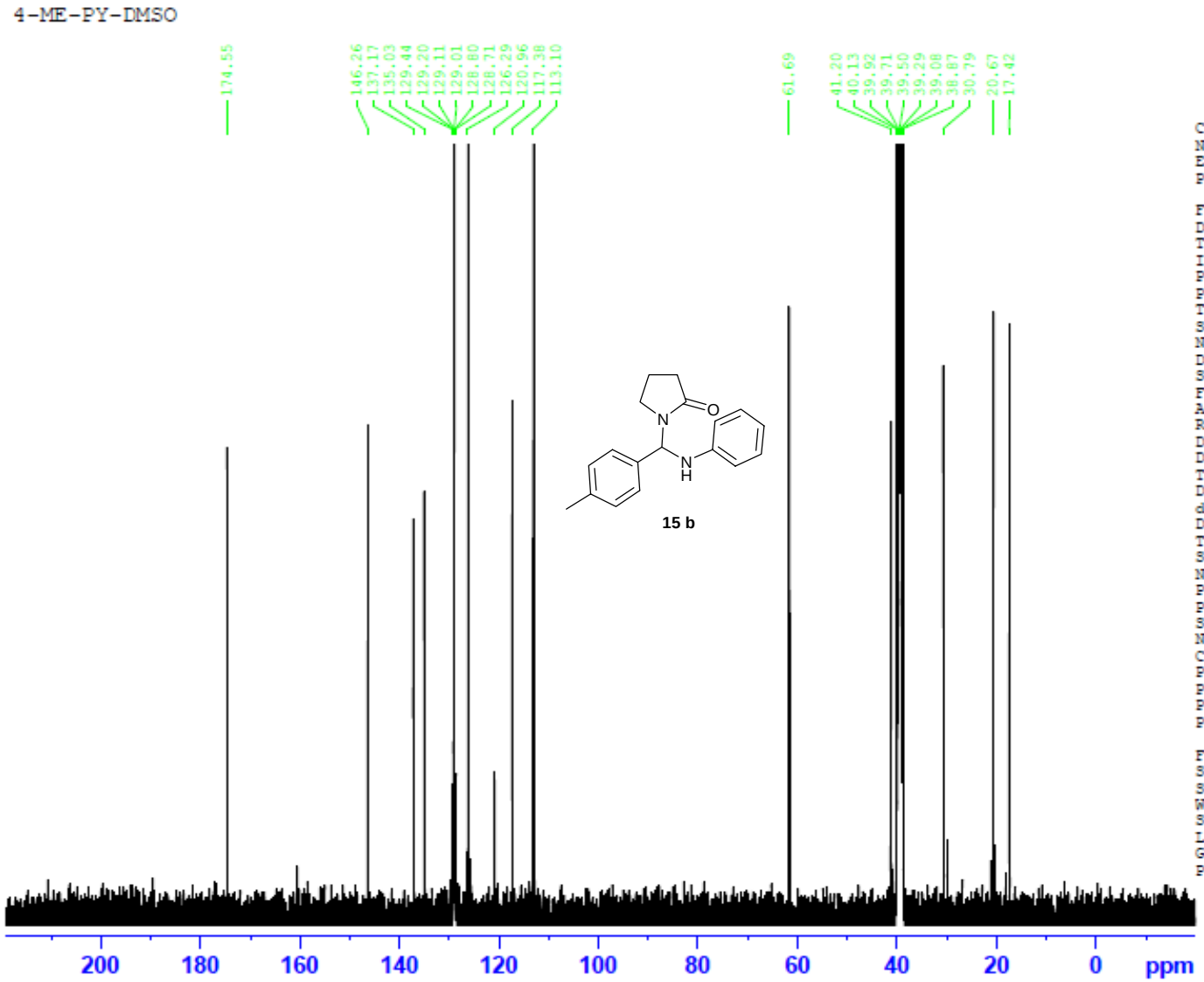
C^{13} NMR- 1-((phenylamino)(p-tolyl)methyl)pyrrolidin-2-one (**15b**)

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EXPNO                      12
PROCNO                      1

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PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       512
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     112.69
DW                     20.800 usec
DE                      6.50 usec
TE                     293.6 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
TD0                         1
SFO1              100.6550182 MHz
NUC1                      13C
P1                       9.80 usec
PLW1              58.00000000 W
SFO2              400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2              14.00000000 W
PLW12              0.35097000 W
PLW13              0.28428999 W

F2 - Processing parameters
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SF                100.6450012 MHz
WDW                         EM
SSB       0
LB                       1.00 Hz
GB        0
PC                       1.40
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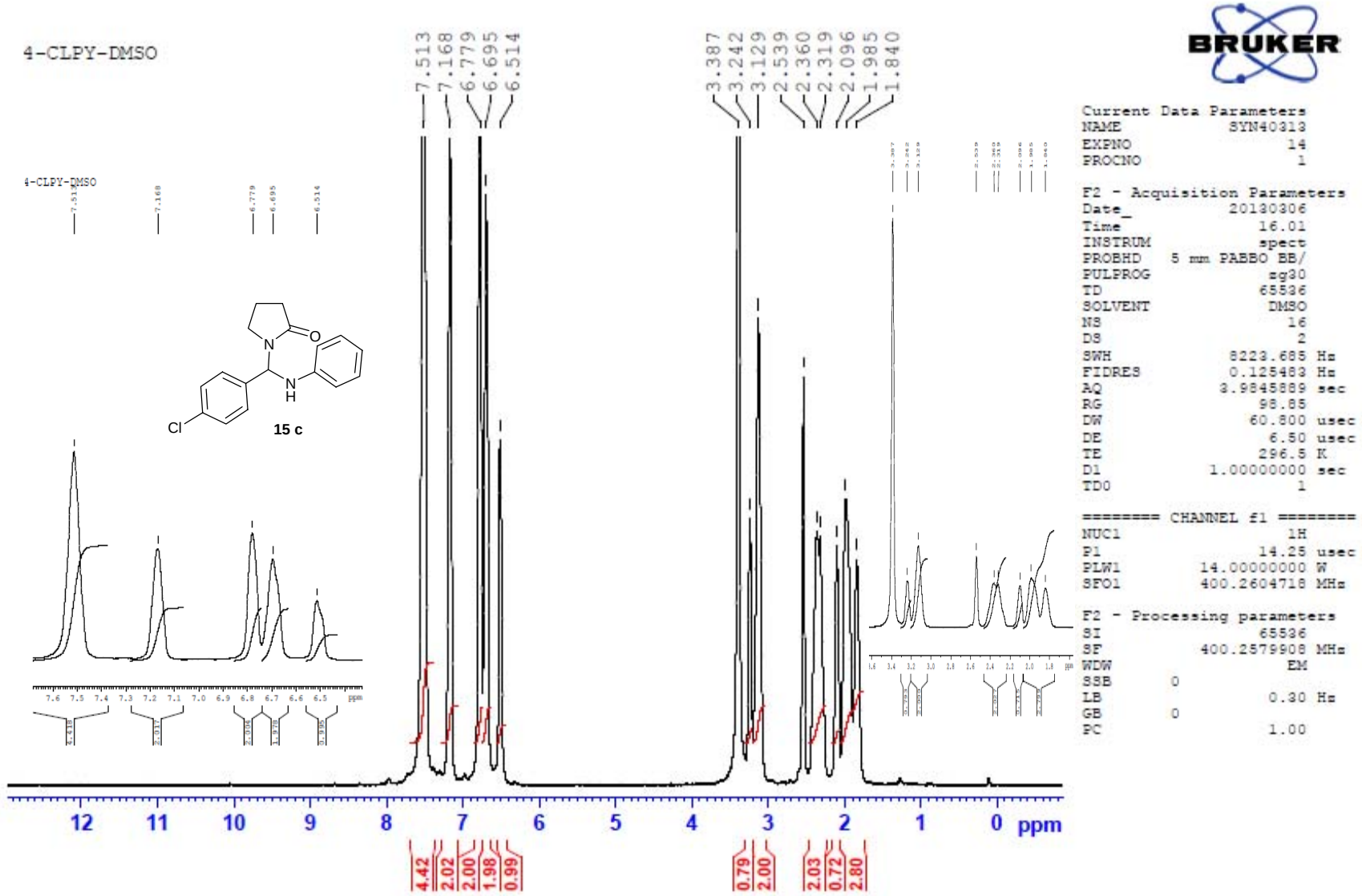
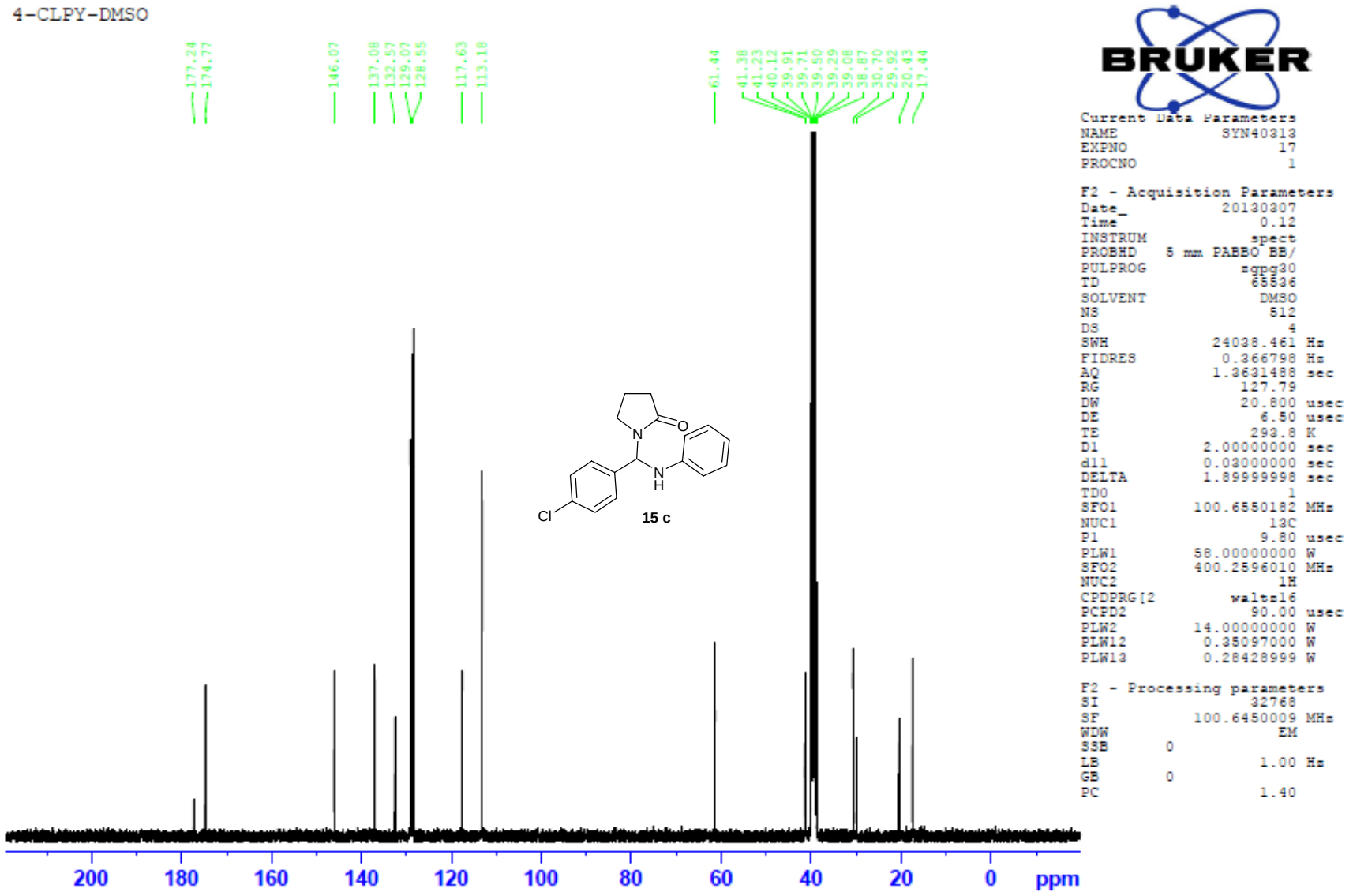
^{1}H NMR- 1-((4-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15c**)



C^{13} NMR- 1-((4-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15c**)

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EXPNO                      17
PROCNO                      1

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Time                    0.12
INSTRUM                spect
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PULPROG             zgpg30
TD                       65536
SOLVENT                  DMSO
NS                        512
DS                          4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      127.79
DW                      20.800 usec
DE                       6.50 usec
TE                      293.8 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                         1
SFO1               100.6550182 MHz
NUC1                      13C
P1                       9.80 usec
PLW1               58.00000000 W
SFO2               400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6450009 MHz
WDW                        EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
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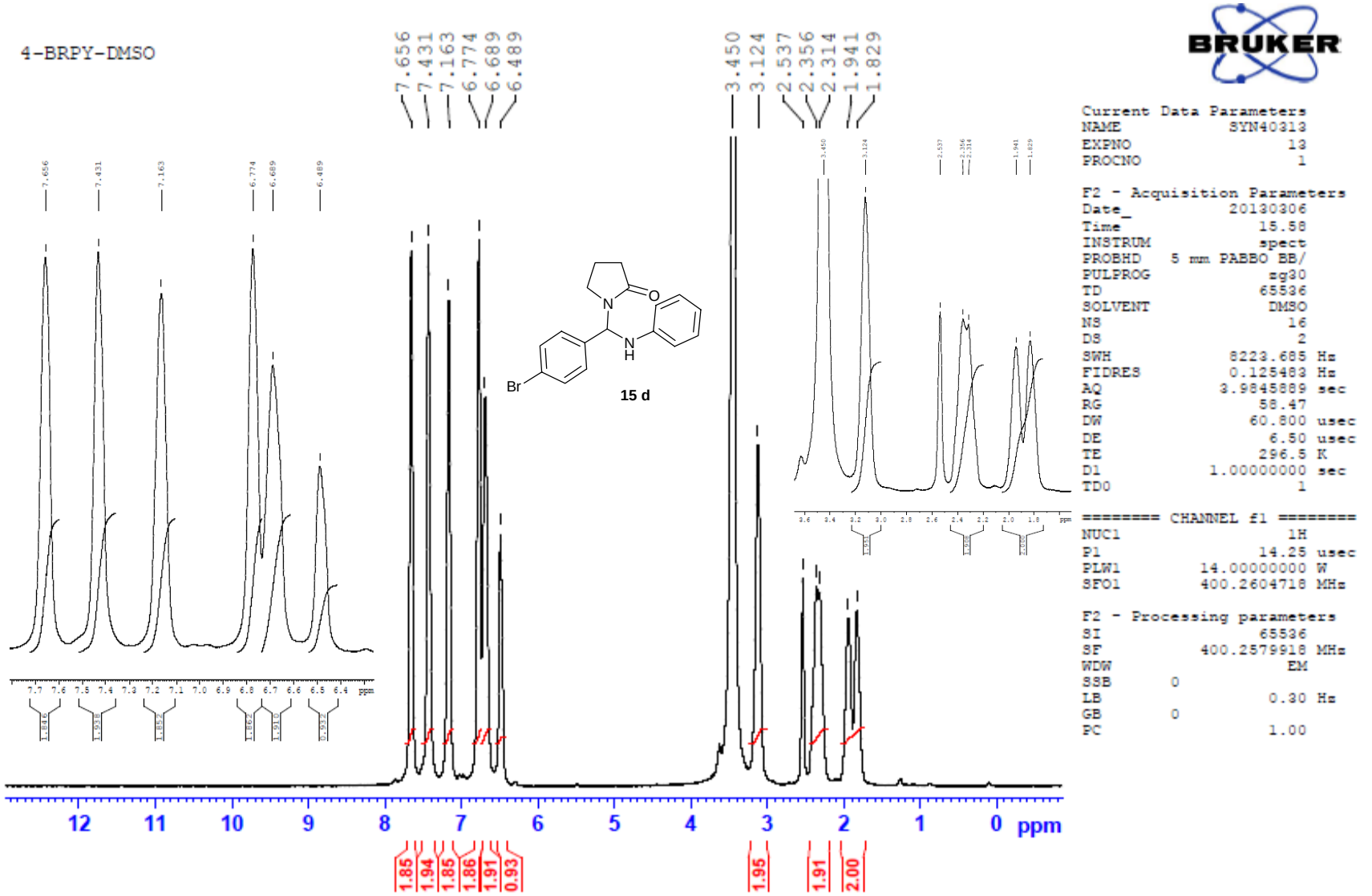
^{1}H NMR- 1-((4-bromophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15d**)

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EXPNO                       13
PROCNO                       1

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PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      58.47
DW                     60.800 usec
DE                      6.50 usec
TE                     296.5 K
D1                  1.00000000 sec
TD0                          1

========= CHANNEL f1 =========
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P1                       14.25 usec
PLW1               14.00000000 W
SFO1               400.2604718 MHz

F2 - Processing parameters
SI                          65536
SF                 400.2579918 MHz
WDW                            EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
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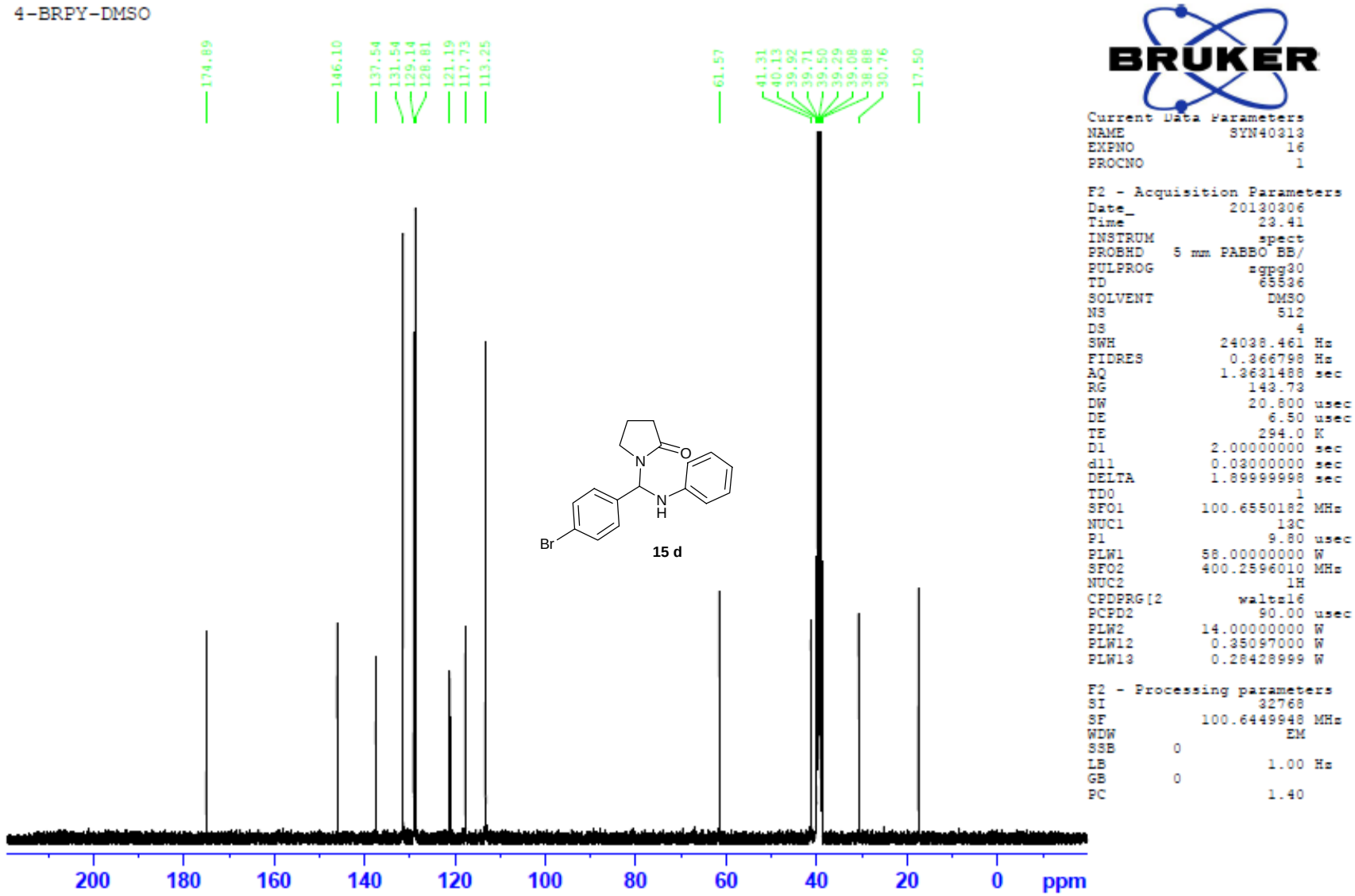
C^{13} NMR- 1-((4-bromophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15d**)

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PROCNO                       1

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INSTRUM                 spect
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PULPROG                 zgpg30
TD                       65536
SOLVENT                    DMSO
NS                          512
DS                            4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      143.73
DW                      20.800 usec
DE                       6.50 usec
TE                      294.0 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
TD0                          1
SFO1               100.6550162 MHz
NUC1                       13C
P1                        9.80 usec
PLW1               58.00000000 W
SFO2               400.2596010 MHz
NUC2                       1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6449948 MHz
WDW                         EM
SSB                  0
LB                        1.00 Hz
GB                   0
PC                        1.40
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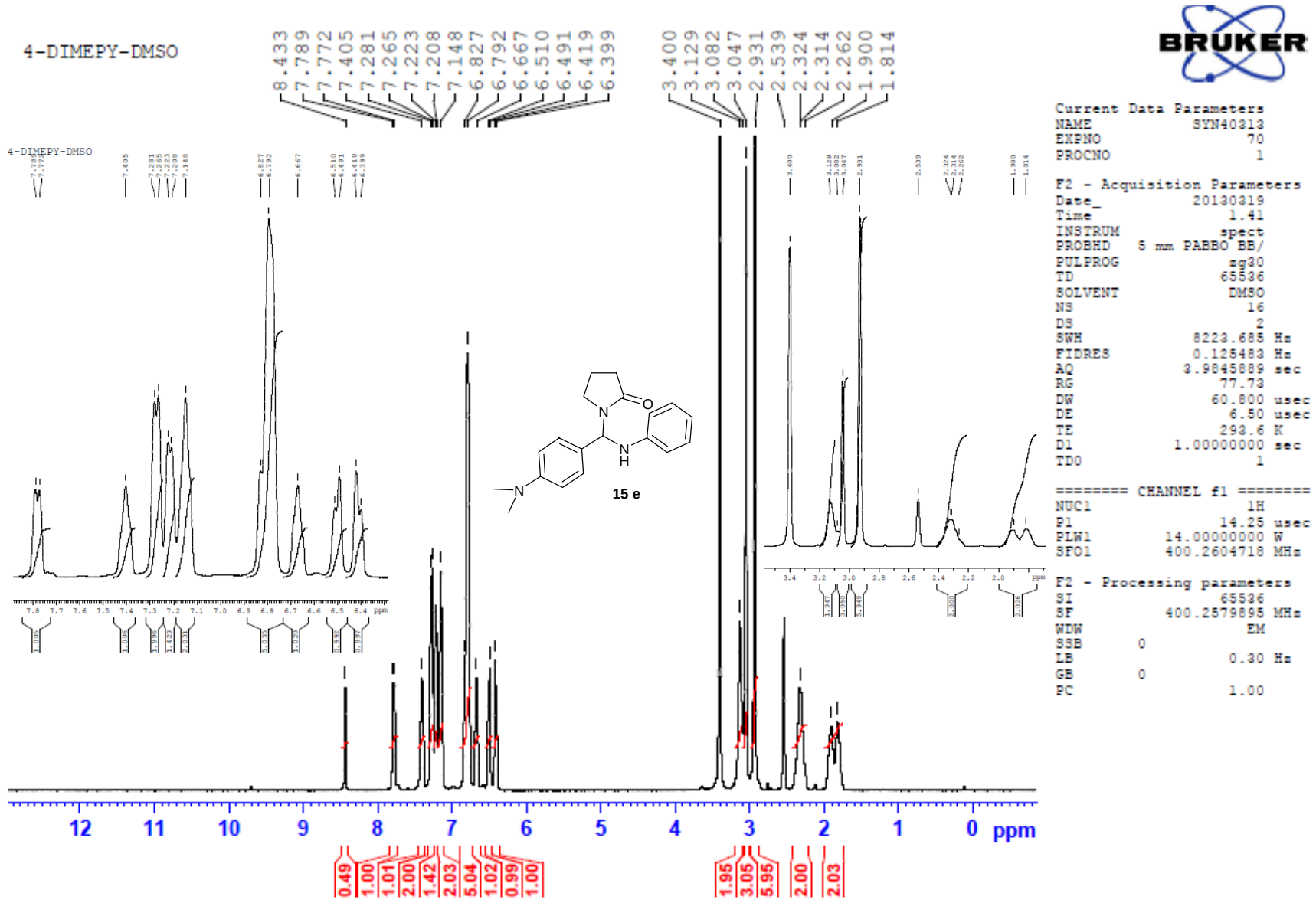
^{1}H NMR- 1-((4-(dimethylamino)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15e**)



BRUKER

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Current Data Parameters
NAME                  SYN40313
EXPNO                       70
PROCNO                       1

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Time                     1.41
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PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                          16
DS                           2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                       77.73
DW                      60.800 usec
DE                       6.50 usec
TE                      293.6 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1             14.00000000 W
SFO1             400.2604718 MHz

F2 - Processing parameters
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SF                400.2579895 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
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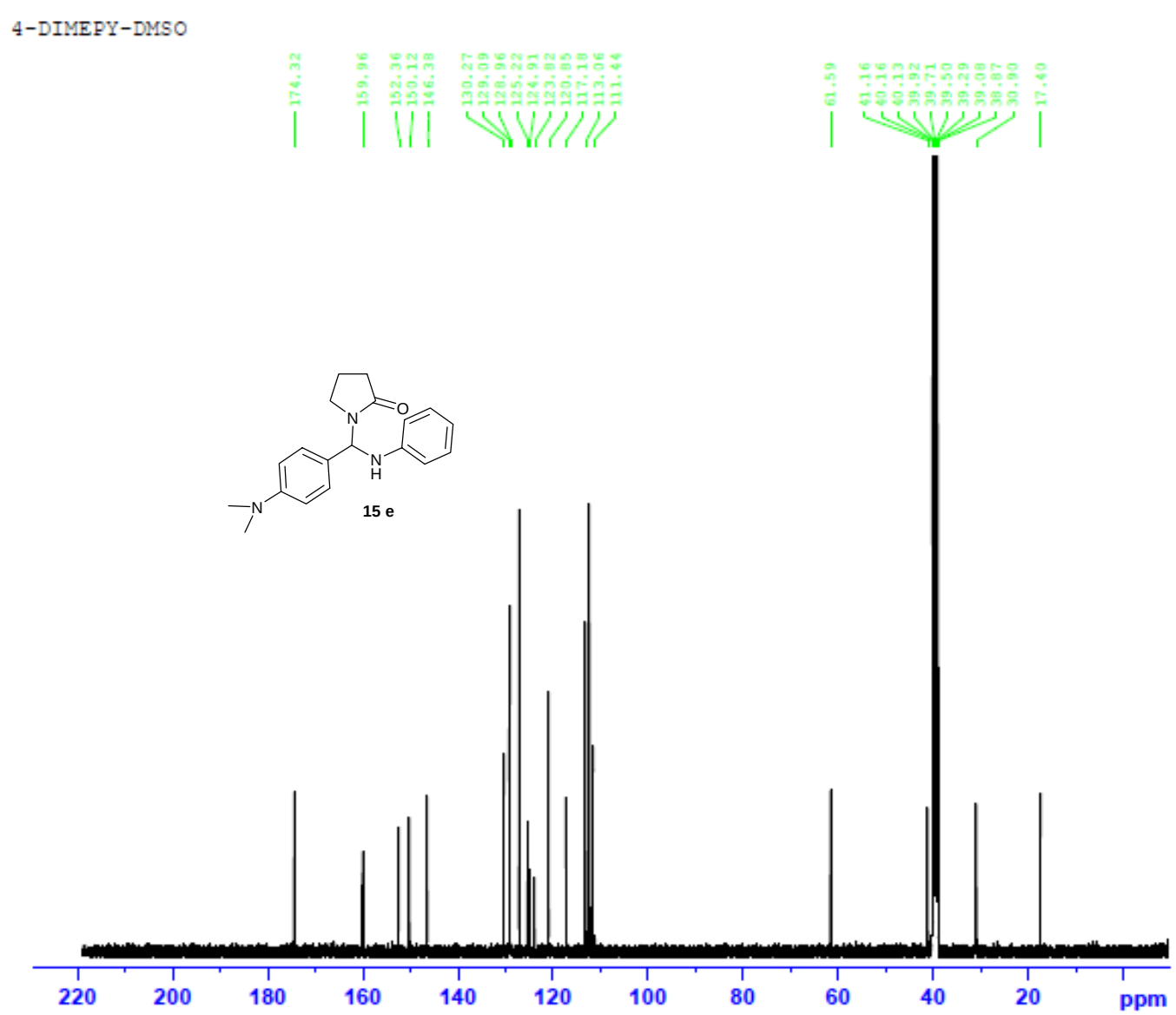
C^{13} NMR- 1-((4-(dimethylamino)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15e**)

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Current Data Parameters
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EXPNO                      71
PROCNO                      1

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Time                    2.11
INSTRUM                spect
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PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       512
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     127.79
DW                   20.800 usec
DE                    6.50 usec
TE                     294.3 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
TD0                        1
SFO1            100.6550182 MHz
NUC1                     13C
P1                    9.80 usec
PLW1             58.00000000 W
SFO2            400.2596010 MHz
NUC2                     1H
CPDPRG[2              waltz16
PCPD2                90.00 usec
PLW2             14.00000000 W
PLW12             0.35097000 W
PLW13             0.28428999 W

F2 - Processing parameters
SI                       32768
SF              100.6450017 MHz
WDW                         EM
SSB         0
LB                    1.00 Hz
GB          0
PC                    1.40
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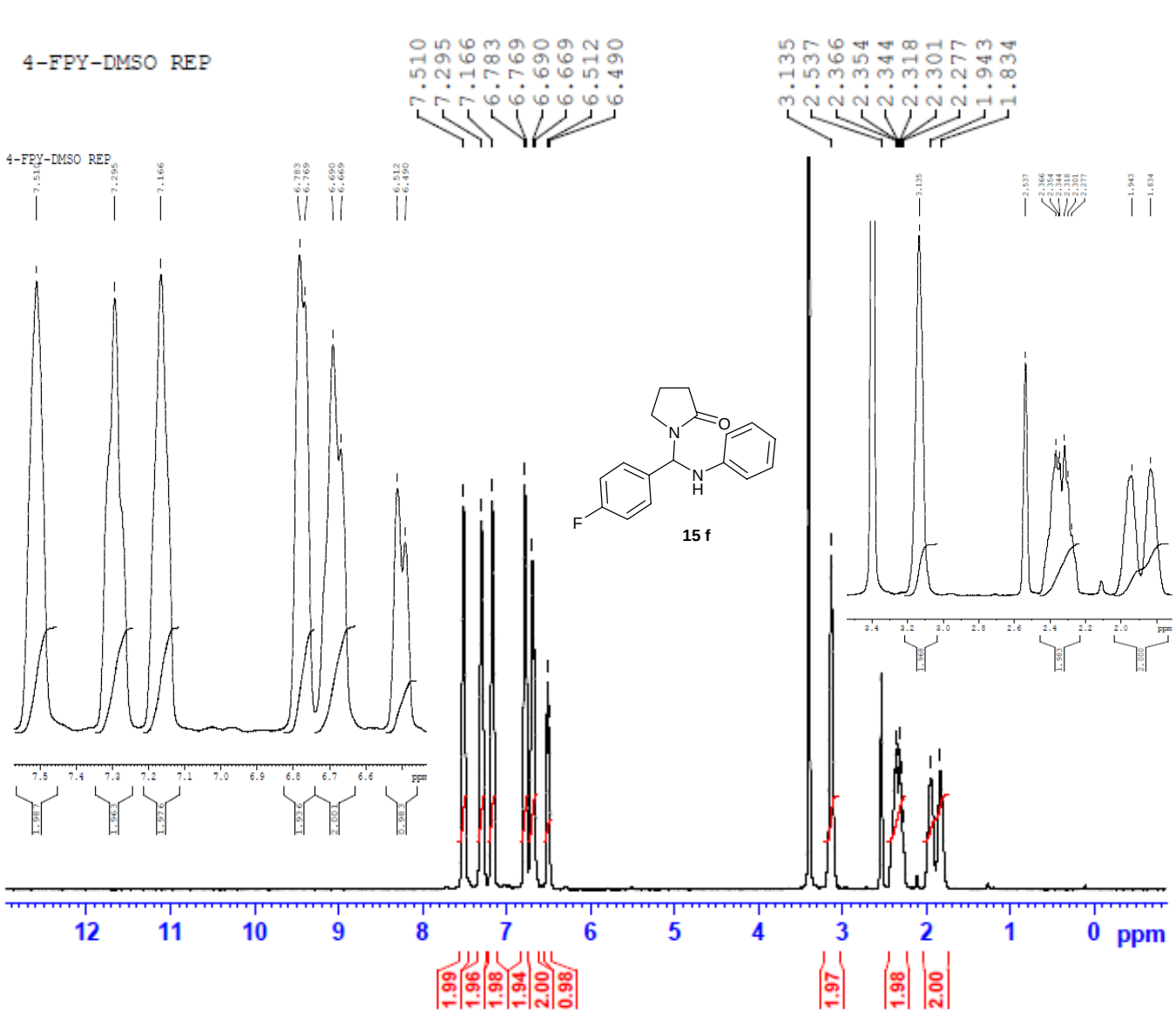
^{1}H NMR- 1-((4-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15f**)



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Current Data Parameters
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PROCNO                       1

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Time                      1.07
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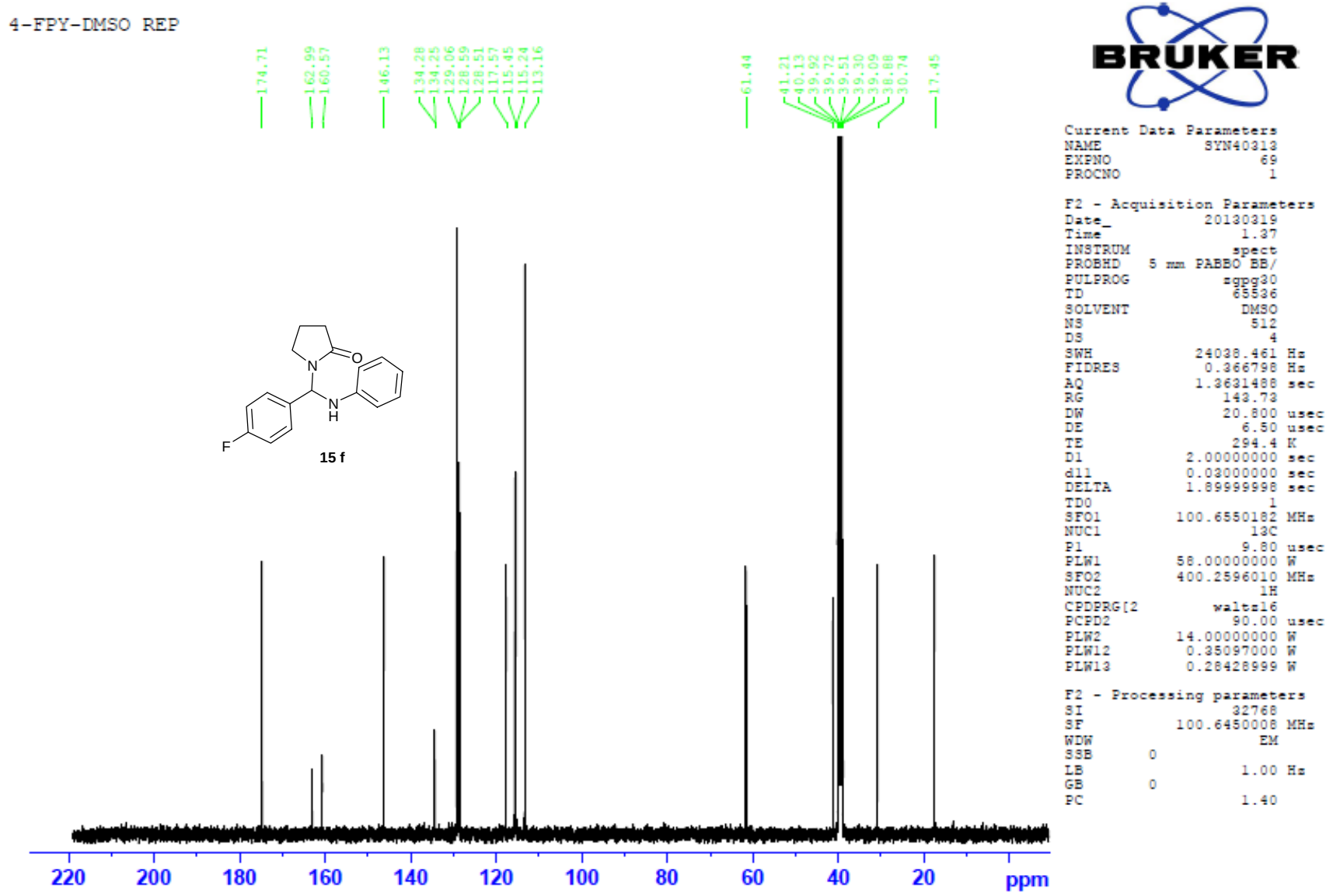
PROBHD     5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      88.69
DW                     60.800 usec
DE                      6.50 usec
TE                     293.8 K
D1                 1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.25 usec
PLW1               14.00000000 W
SFO1               400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                 400.2579905 MHz
WDW                        EM
SSB                 0
LB                      0.30 Hz
GB                  0
PC                      1.00
```

C^{13} NMR- 1-((4-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15f**)

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Current Data Parameters
NAME                 SYN40313
EXPNO                      69
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130319
Time                    1.37
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG             zgpg30
TD                      65536
SOLVENT                 DMSO
NS                        512
DS                          4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     143.73
DW                     20.800 usec
DE                      6.50 usec
TE                     294.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
TD0                         1
SFO1              100.6550182 MHz
NUC1                      13C
P1                      9.80 usec
PLW1              58.00000000 W
SFO2              400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                  90.00 usec
PLW2              14.00000000 W
PLW12              0.35097000 W
PLW13              0.28428999 W

F2 - Processing parameters
SI                      32768
SF                100.6450008 MHz
WDW                        EM
SSB       0
LB                      1.00 Hz
GB        0
PC                      1.40
```
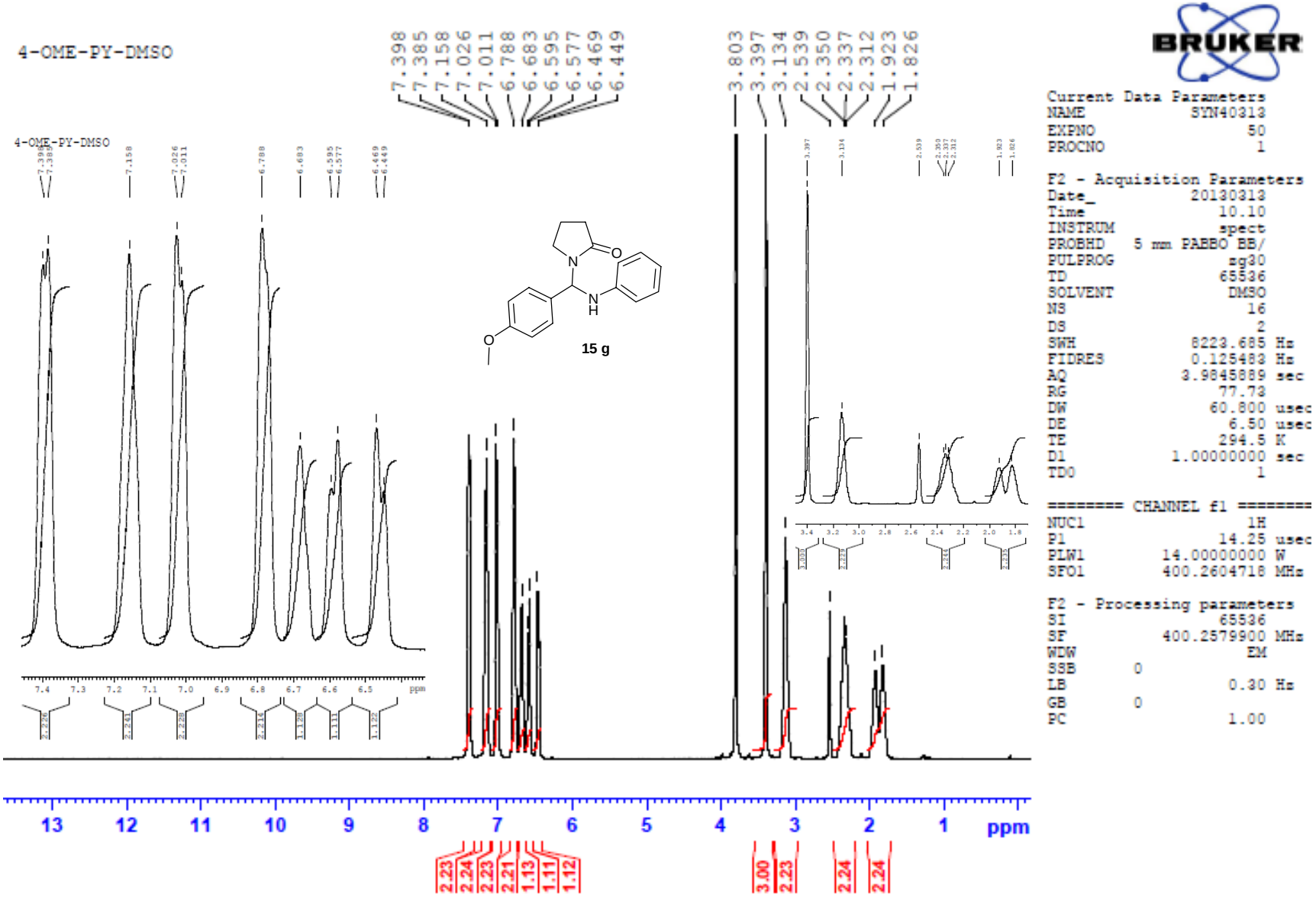
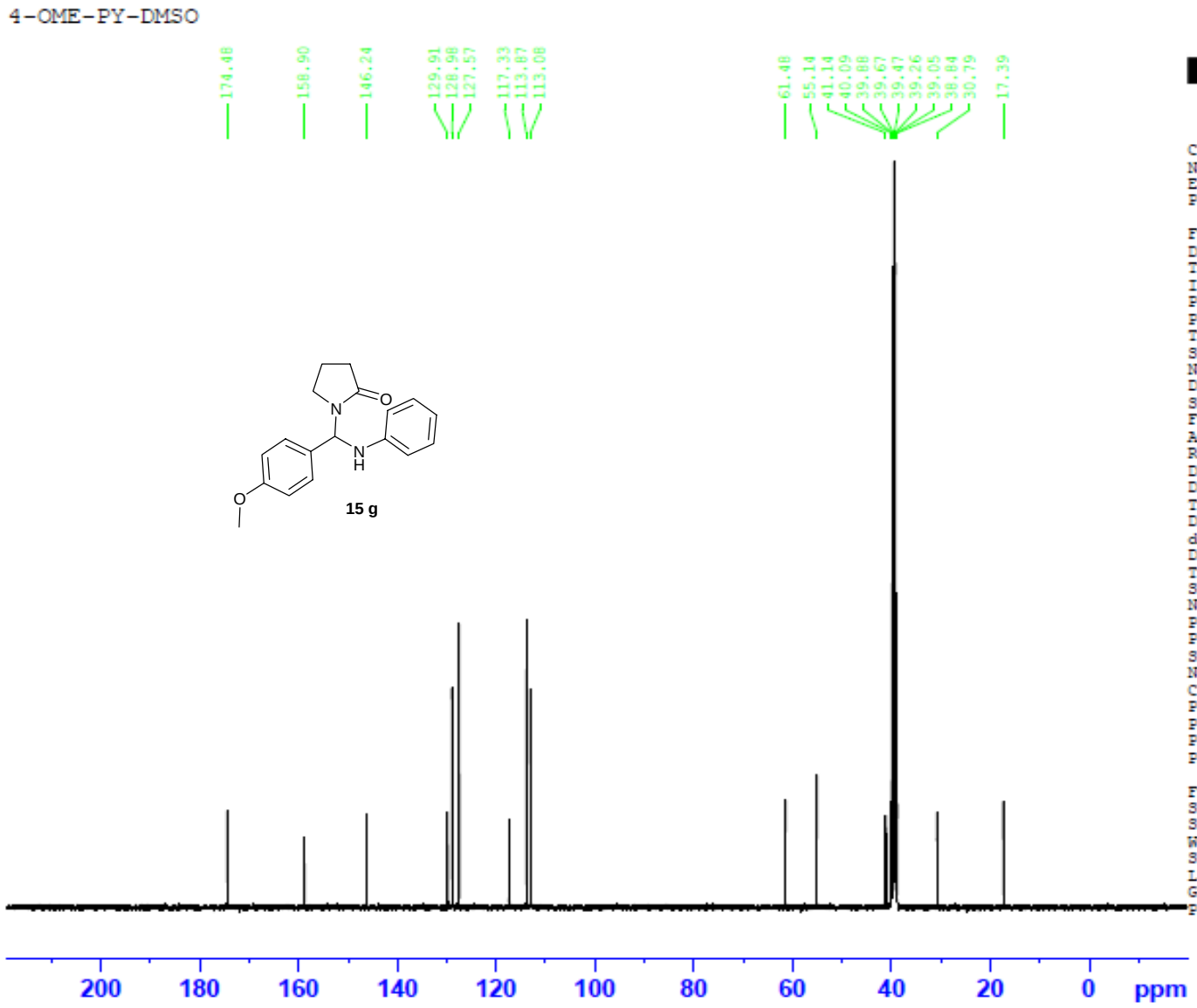

^{1}H NMR- 1-((4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15g**)



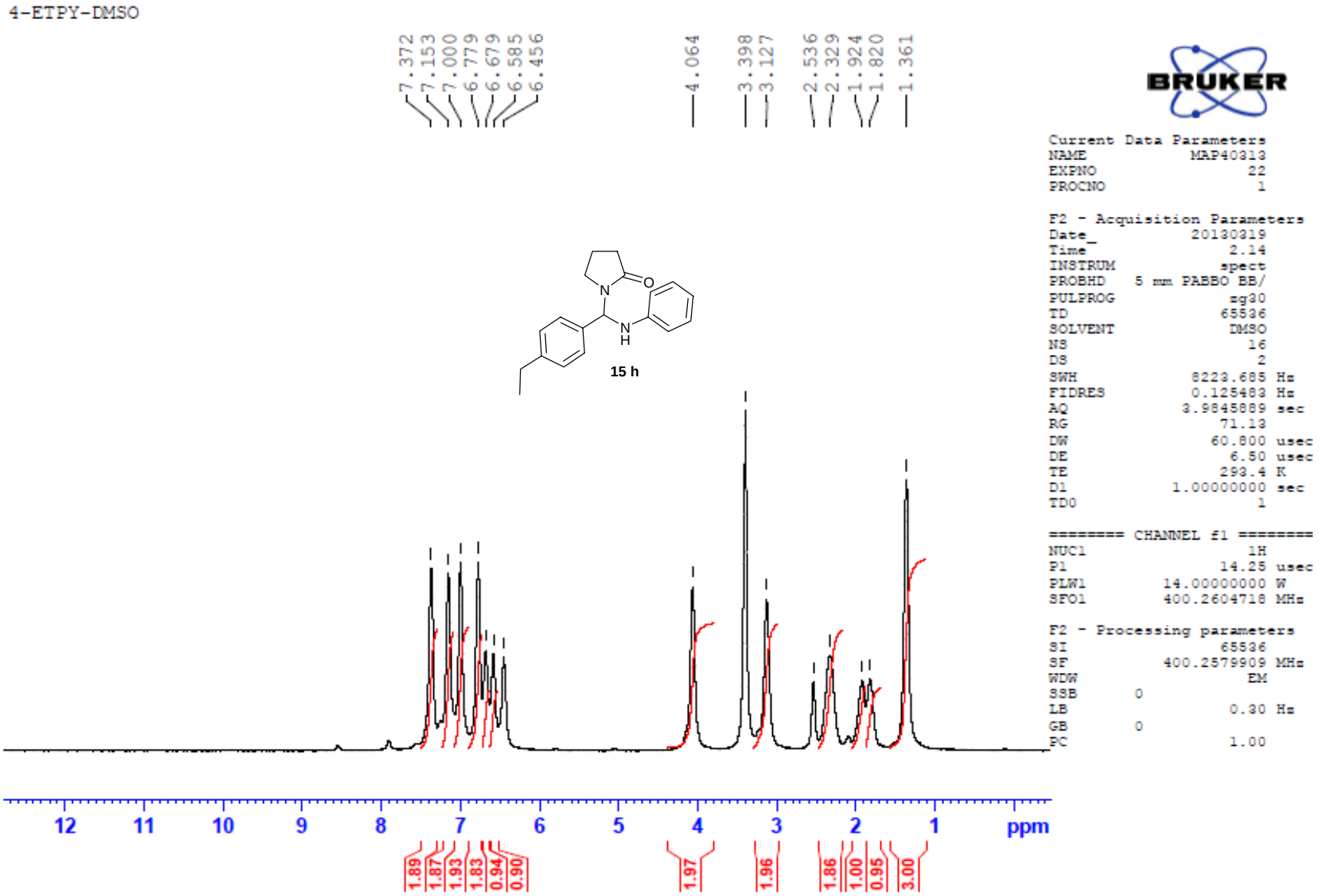

```
Current Data Parameters
NAME                 SYN40313
EXPNO                      50
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130313
Time                   10.10
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 6223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                     77.73
DW                    60.800 usec
DE                     6.50 usec
TE                    294.5 K
D1                 1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.25 usec
PLW1           14.00000000 W
SFO1           400.2604718 MHz

F2 - Processing parameters
SI                    65536
SF             400.2579900 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```

C^{13} NMR- 1-((4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15g**)



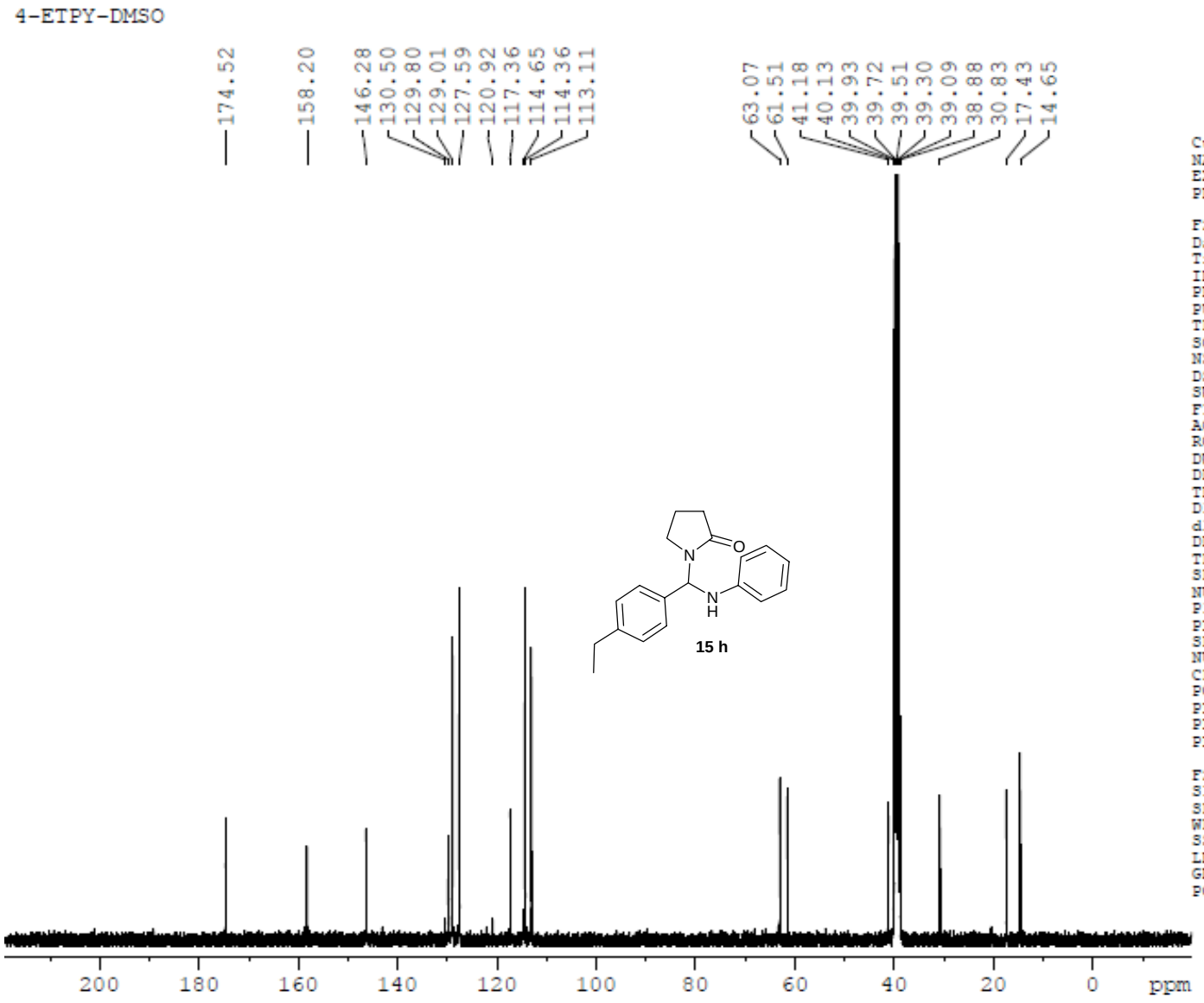

```
Current Data Parameters
NAME                  SYN40313
EXPNO                       52
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130314
Time                    4.14
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                   DMSO
NS                         512
DS                           4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                       63.11
DW                      20.800 usec
DE                       6.50 usec
TE                      293.7 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                          1
SFO1               100.6550182 MHz
NUC1                        13C
P1                       9.80 usec
PLW1               58.00000000 W
SFO2               400.2596010 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                   90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6450043 MHz
WDW                         EM
SSB       0
LB                       1.00 Hz
GB        0
PC                       1.40
```

^{1}H NMR- 1-((4-ethylphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15h**)



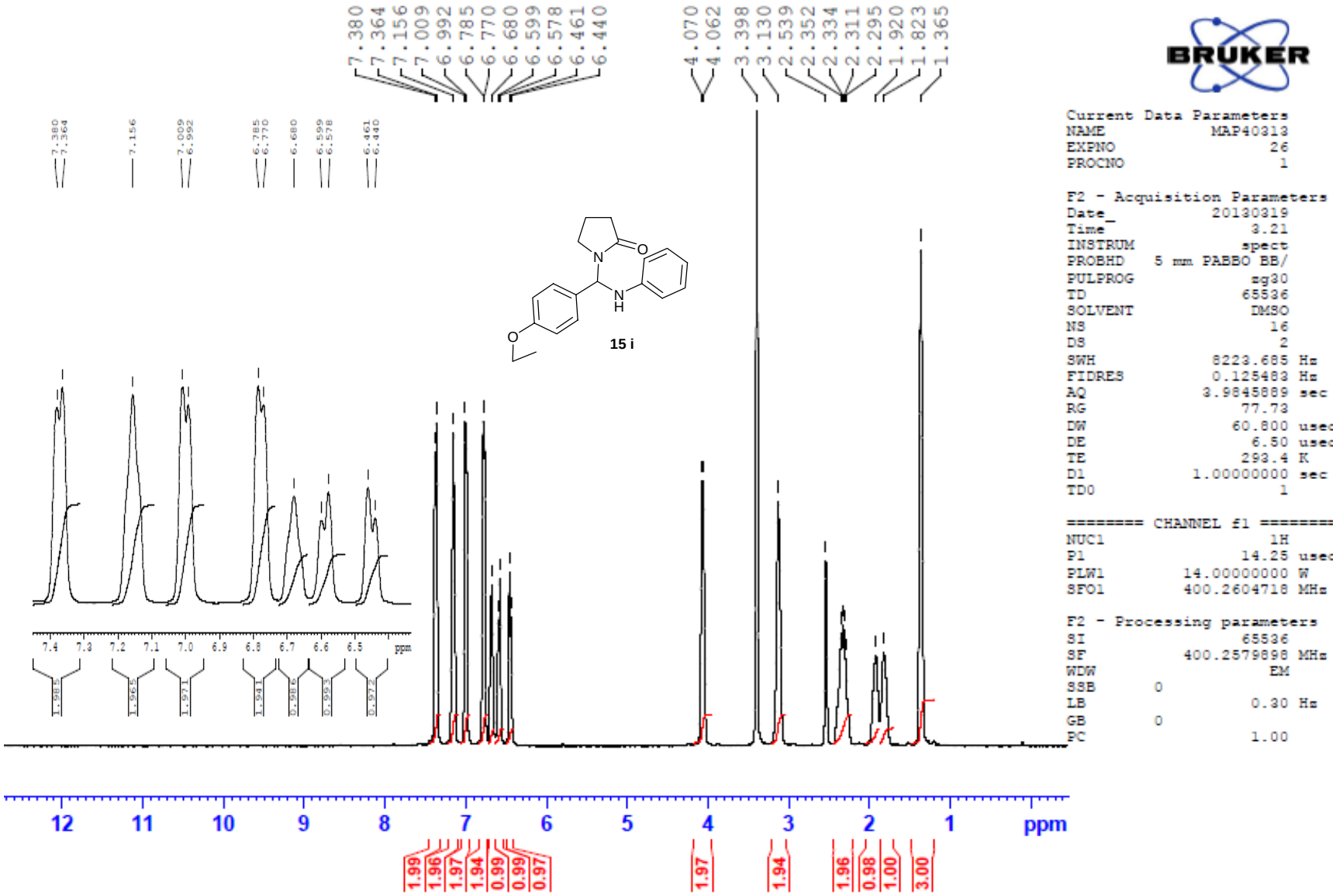

```
Current Data Parameters
NAME            MAP40313
EXPNO                 22
PROCNO                 1

F2 - Acquisition Parameters
Date_           20130319
Time                2.14
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG             zg30
TD                 65536
SOLVENT             DMSO
NS                    16
DS                     2
SWH             8223.685 Hz
FIDRES          0.125483 Hz
AQ              3.9845889 sec
RG                 71.13
DW                60.800 usec
DE                 6.50 usec
TE                293.4 K
D1             1.00000000 sec
TD0                    1

======== CHANNEL f1 ========
NUC1                  1H
P1                14.25 usec
PLW1         14.00000000 W
SFO1         400.2604718 MHz

F2 - Processing parameters
SI                 65536
SF          400.2579909 MHz
WDW                   EM
SSB       0
LB                0.30 Hz
GB        0
PC                1.00
```

C^{13} NMR- 1-((4-ethylphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15h**)

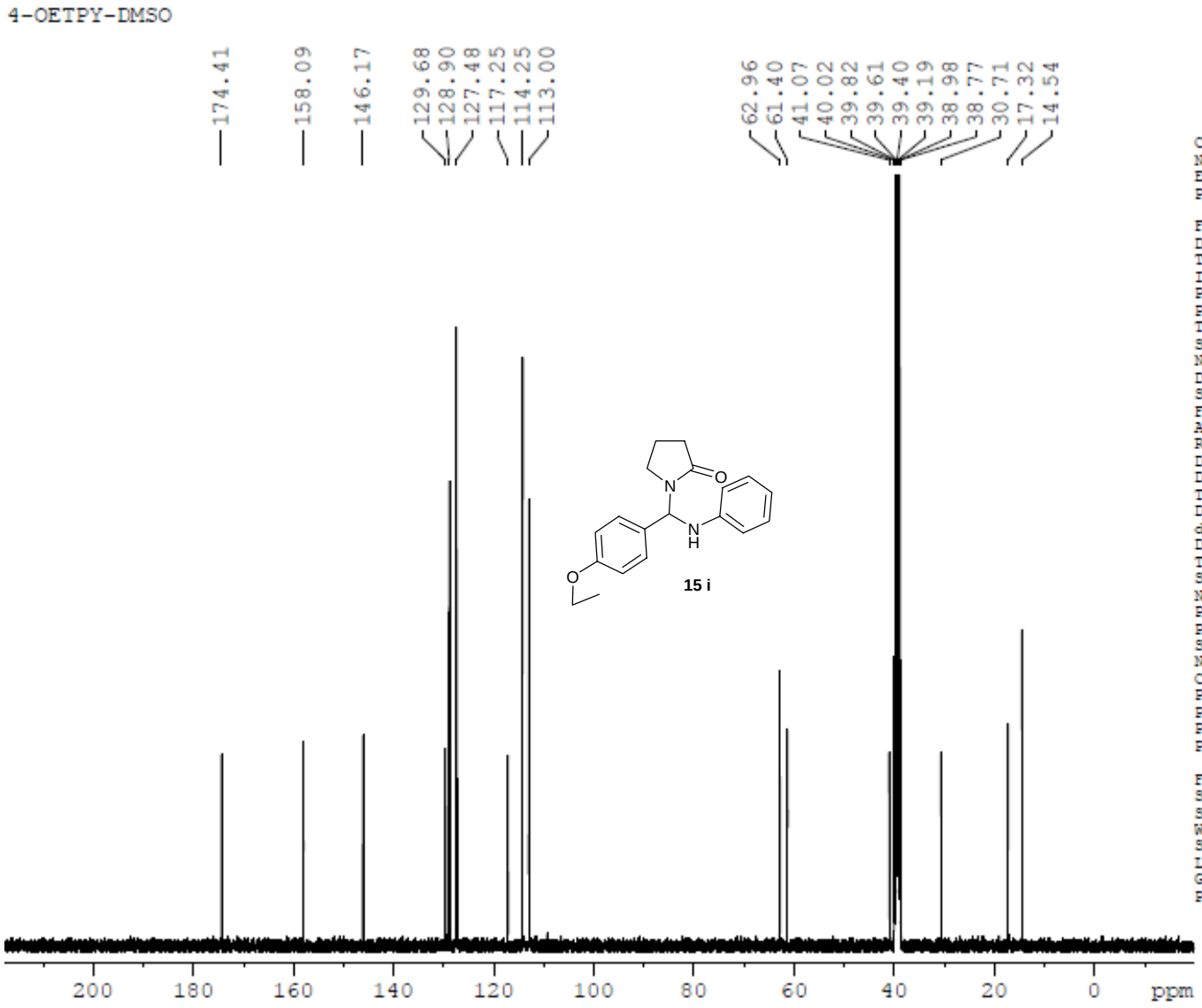



```
Current Data Parameters
NAME              MAP40313
EXPNO                   23
PROCNO                   1

F2 - Acquisition Parameters
Date_              20130319
Time                   2.44
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG            zgpg30
TD                  65536
SOLVENT               DMSO
NS                      512
DS                        4
SWH               24038.461 Hz
FIDRES             0.366798 Hz
AQ                1.3631488 sec
RG                   143.73
DW                   20.800 usec
DE                    6.50 usec
TE                   294.1 K
D1                2.00000000 sec
d11               0.03000000 sec
DELTA             1.89999998 sec
TD0                       1
SFO1            100.6550182 MHz
NUC1                    13C
P1                    9.80 usec
PLW1             58.00000000 W
SFO2            400.2596010 MHz
NUC2                    1H
CPDPRG[2             waltz16
PCPD2                90.00 usec
PLW2             14.00000000 W
PLW12             0.35097000 W
PLW13             0.28428999 W

F2 - Processing parameters
SI                      32768
SF              100.6450006 MHz
WDW                        EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

^{1}H NMR- 1-((4-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15i**)

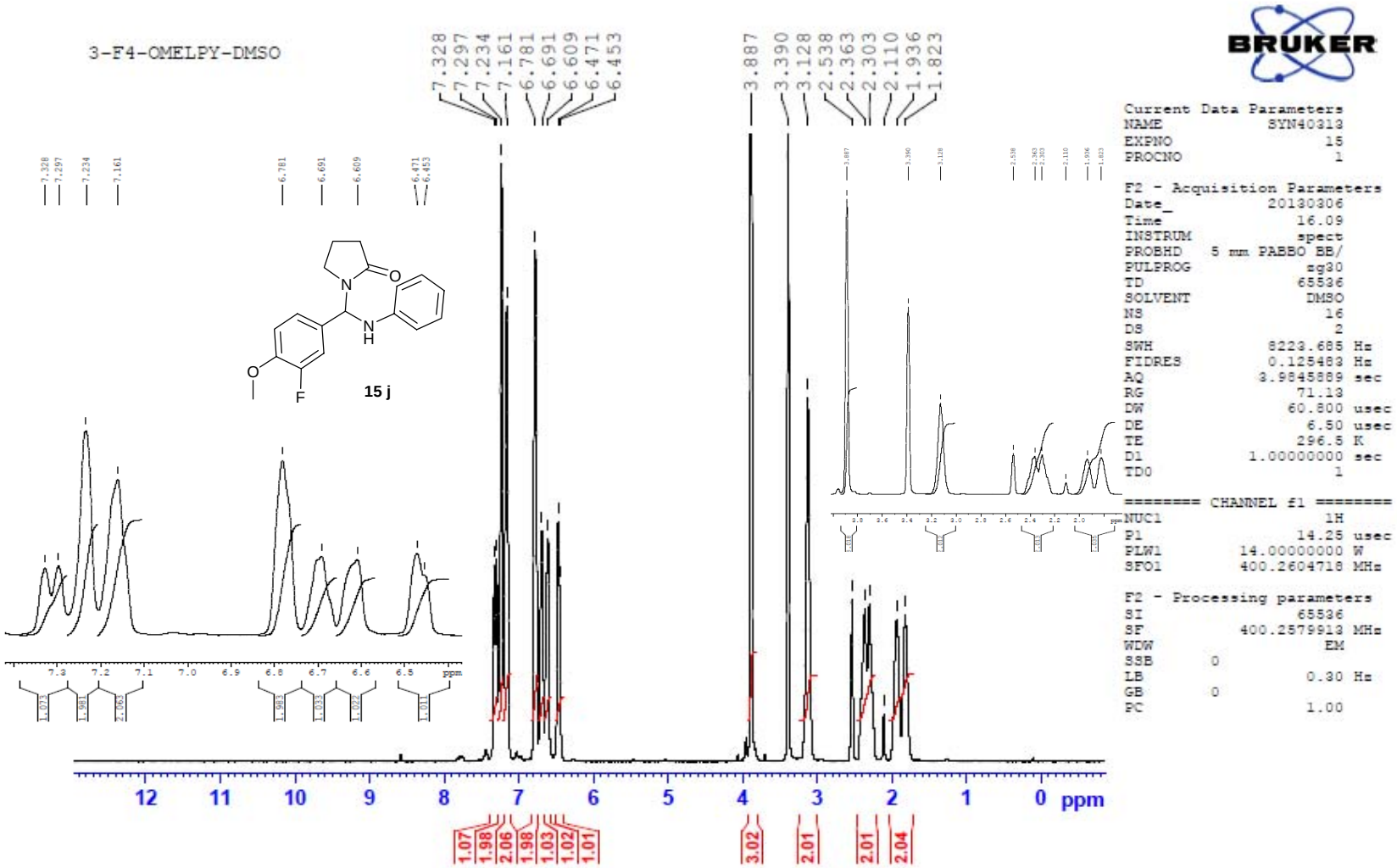


C^{13}NMR- 1-((4-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15i**)



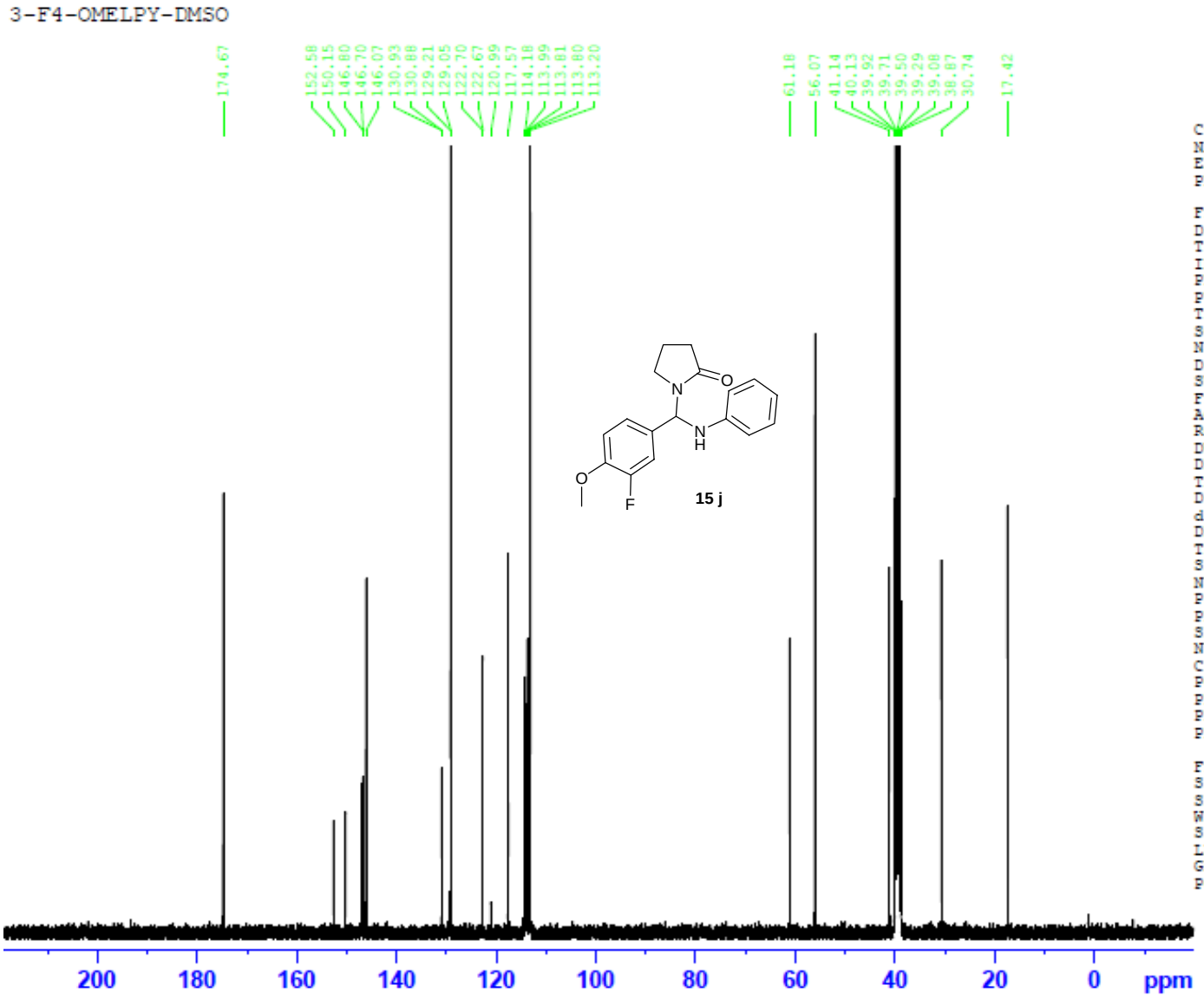

```
Current Data Parameters
NAME                MAP40313
EXPNO                     27
PROCNO                     1

F2 - Acquisition Parameters
Date_              20130319
Time                   3.51
INSTRUM               spect
PROBHD    5 mm PABBO BB/
PULPROG            zgpg30
TD                  65536
SOLVENT               DMSO
NS                      512
DS                        4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631488 sec
RG                  127.79
DW                 20.800 usec
DE                  6.50 usec
TE                 294.0 K
D1               2.00000000 sec
d11              0.03000000 sec
DELTA            1.89999998 sec
TD0                        1
SFO1           100.6550182 MHz
NUC1                    13C
P1                    9.80 usec
PLW1           58.00000000 W
SFO2           400.2596010 MHz
NUC2                    1H
CPDPRG[2             waltz16
PCPD2                90.00 usec
PLW2           14.00000000 W
PLW12           0.35097000 W
PLW13           0.28428999 W

F2 - Processing parameters
SI                     32768
SF             100.6450115 MHz
WDW                       EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

^{1}H NMR- 1-((3-fluoro-4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15j**)




```
Current Data Parameters
NAME                  SYN40313
EXPNO                       15
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130306
Time                     16.09
INSTRUM                  spect
PROBHD     5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                          16
DS                           2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                       71.13
DW                      60.800 usec
DE                       6.50 usec
TE                      296.5 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1             14.00000000 W
SFO1             400.2604716 MHz

F2 - Processing parameters
SI                      65536
SF                400.2579913 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

^{C13}NMR- 1-((3-fluoro-4-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15j**)

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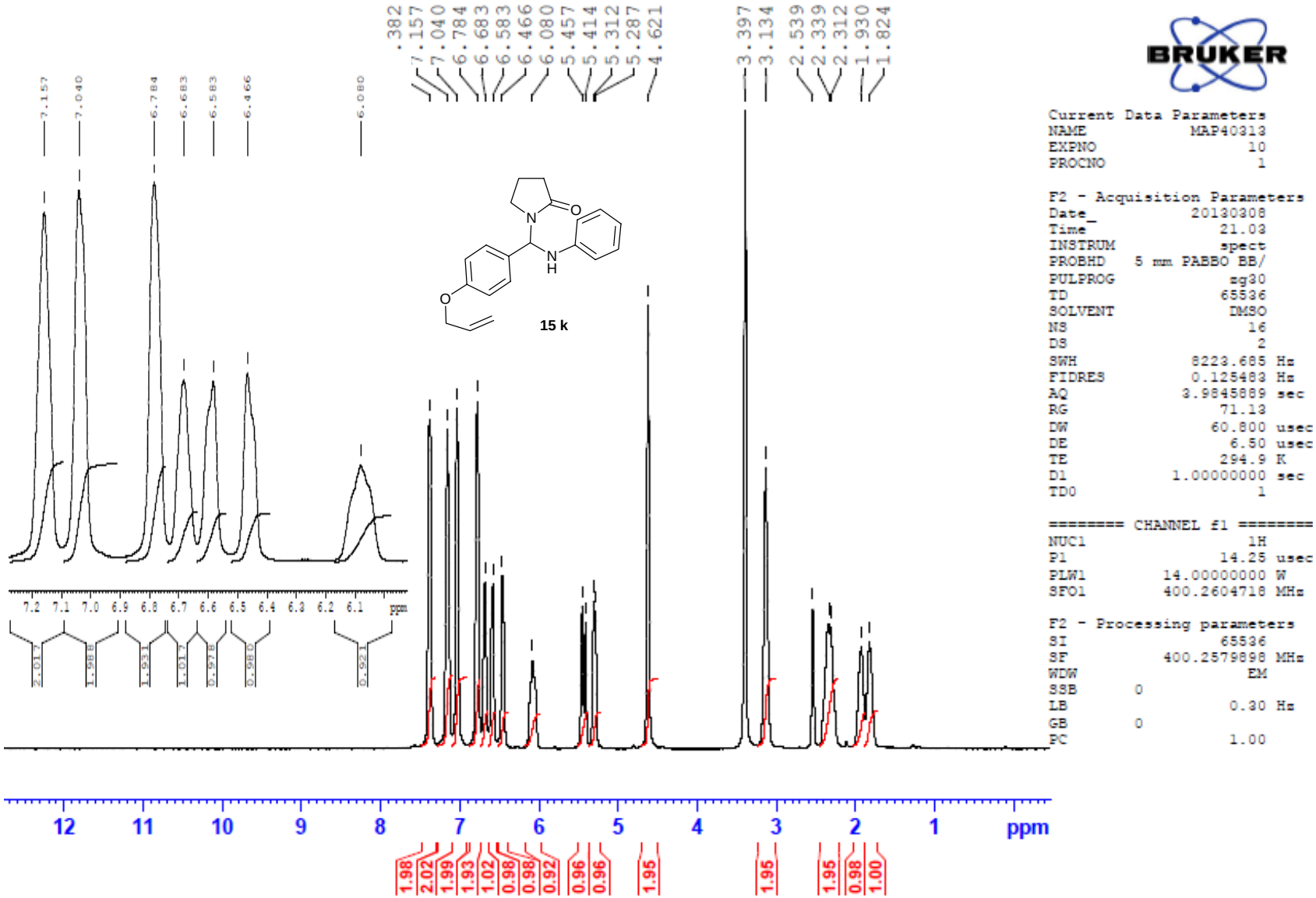
Current Data Parameters
NAME              SYN40313
EXPNO                   18
PROCNO                   1

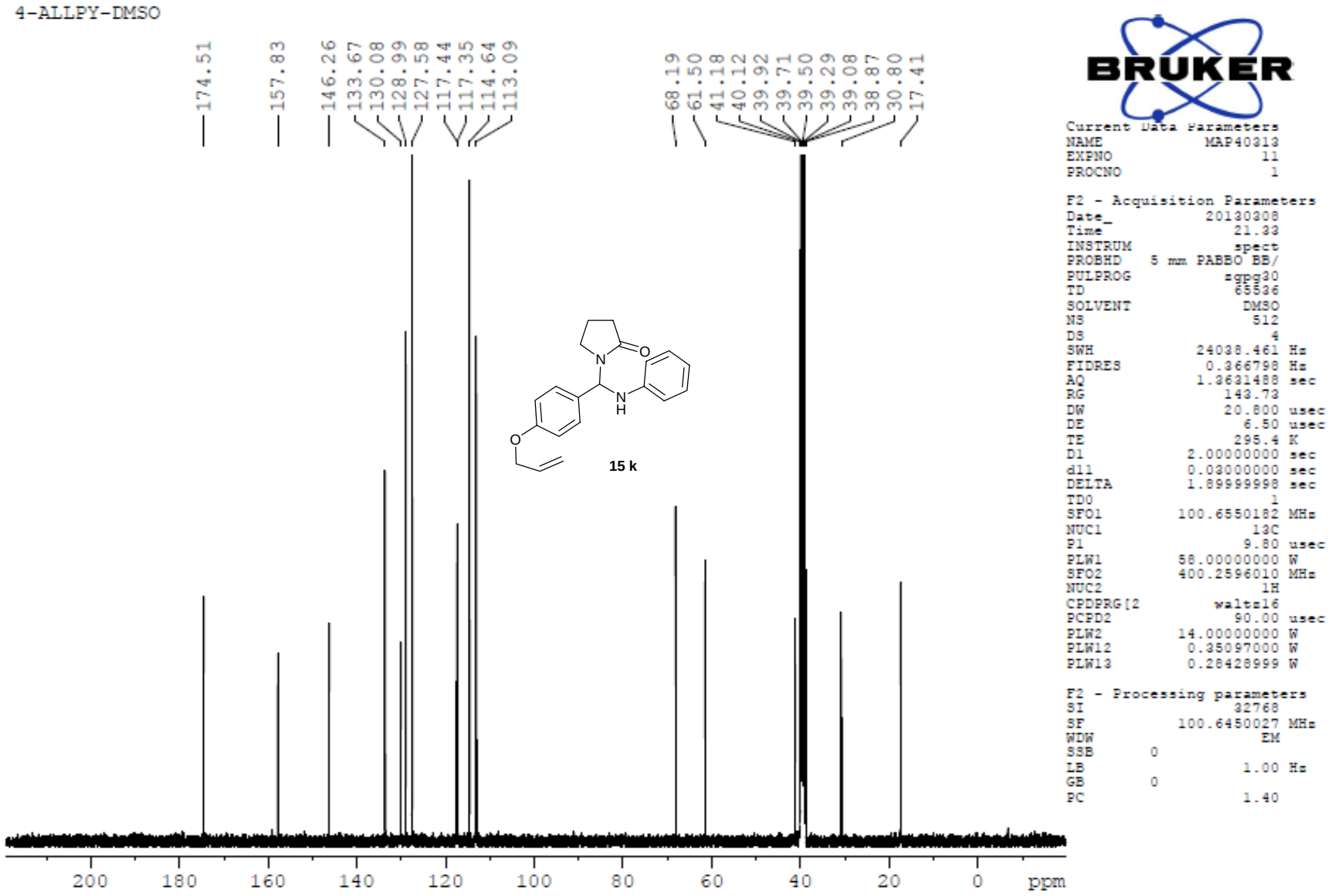
F2 - Acquisition Parameters
Date_             20130307
Time                  1.17
INSTRUM              spect
PROBHD    5 mm PABBO BB/
PULPROG           zgpg30
TD                 65536
SOLVENT              DMSO
NS                     512
DS                       4
SWH             24038.461 Hz
FIDRES              0.366798 Hz
AQ                1.3631488 sec
RG                   143.73
DW                   20.800 usec
DE                    6.50 usec
TE                   293.6 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
TD0                      1
SFO1          100.6550182 MHz
NUC1                  13C
P1                    9.80 usec
PLW1          58.00000000 W
SFO2          400.2596010 MHz
NUC2                  1H
CPDPRG[2           waltz16
PCPD2                90.00 usec
PLW2          14.00000000 W
PLW12          0.35097000 W
PLW13          0.28428999 W

F2 - Processing parameters
SI                   32768
SF            100.6450004 MHz
WDW                     EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

^{1}H NMR- 1-((4-(allyloxy)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15k**)



C^{13} NMR- 1-((4-(allyloxy)phenyl)(phenylamino)methyl)pyrrolidin-2-one (**15k**)

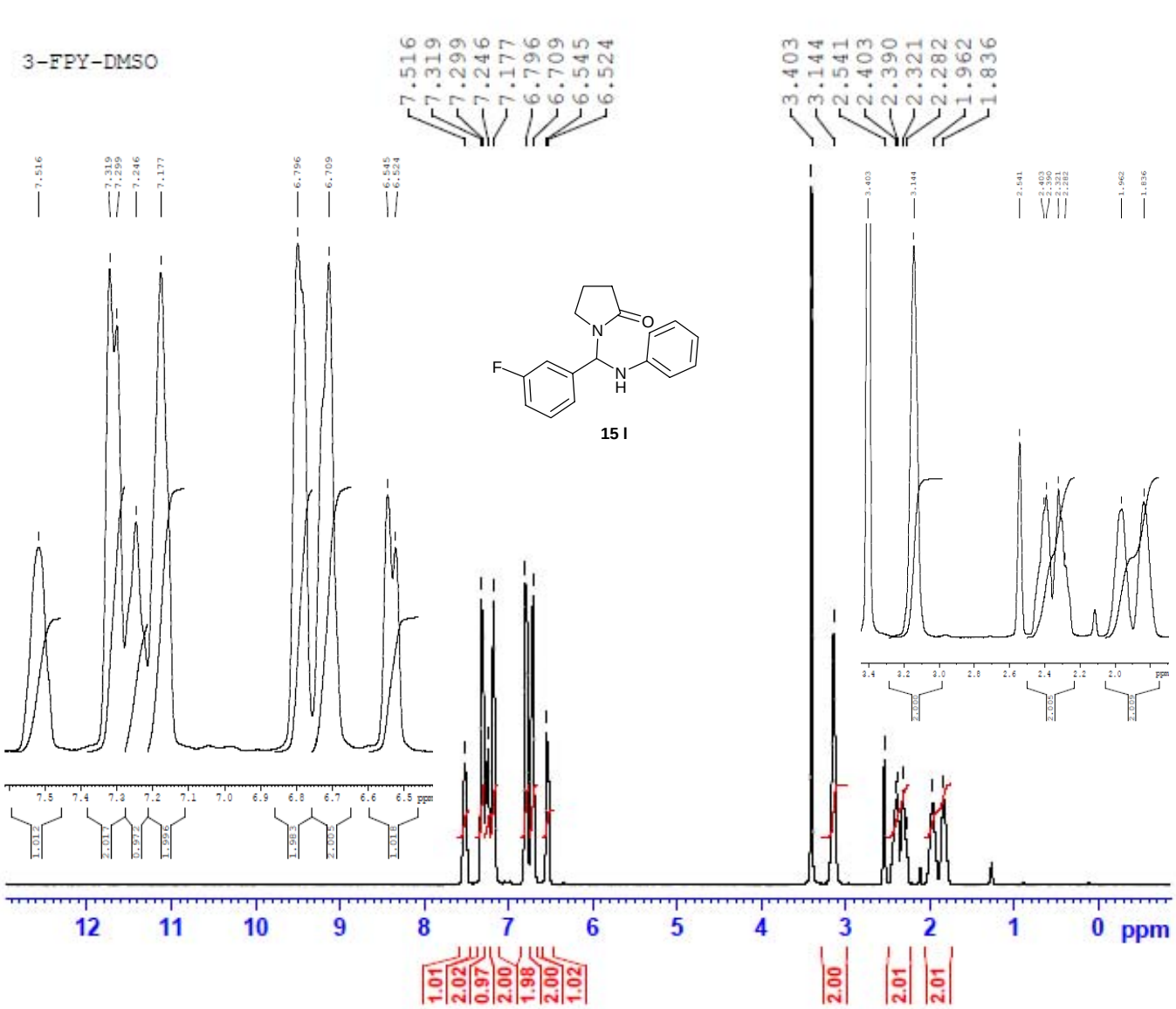



```
Current Data Parameters
NAME                  MAP40313
EXPNO                       11
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130308
Time                    21.33
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                   DMSO
NS                         512
DS                           4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      143.73
DW                      20.800 usec
DE                       6.50 usec
TE                      295.4 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                          1
SFO1               100.6550182 MHz
NUC1                       13C
P1                        9.80 usec
PLW1               58.00000000 W
SFO2               400.2596010 MHz
NUC2                       1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2               14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6450027 MHz
WDW                         EM
SSB          0
LB                        1.00 Hz
GB           0
PC                        1.40
```

^{1}H NMR- 1-((3-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15l**)



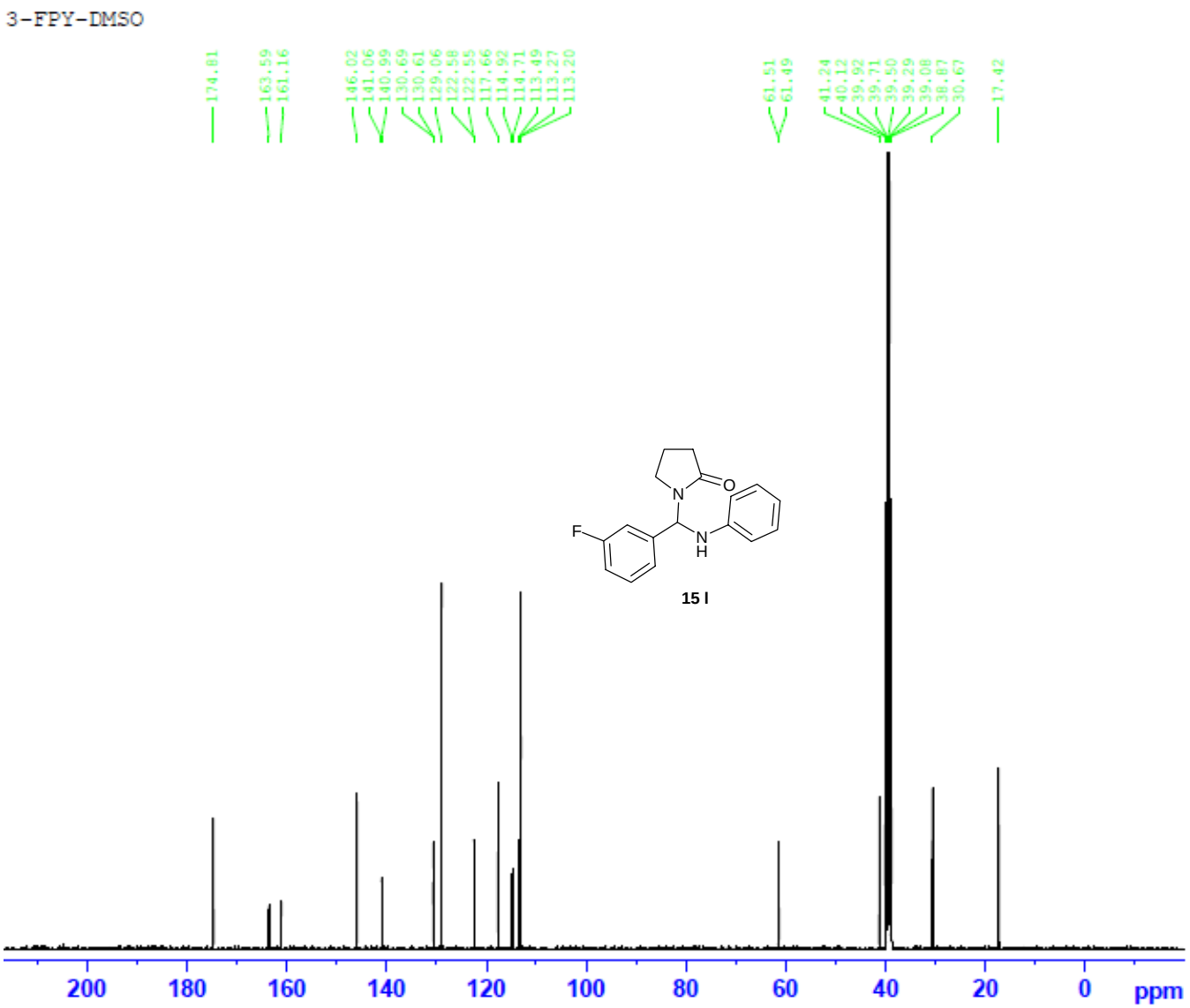

```
Current Data Parameters
NAME                  SYN40313
EXPNO                       66
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130319
Time                      0.33
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845689 sec
RG                        77.73
DW                       60.800 usec
DE                        6.50 usec
TE                       293.9 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1               14.00000000 W
SFO1               400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                 400.2579887 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

C[13] NMR- 1-((3-fluorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15l**)

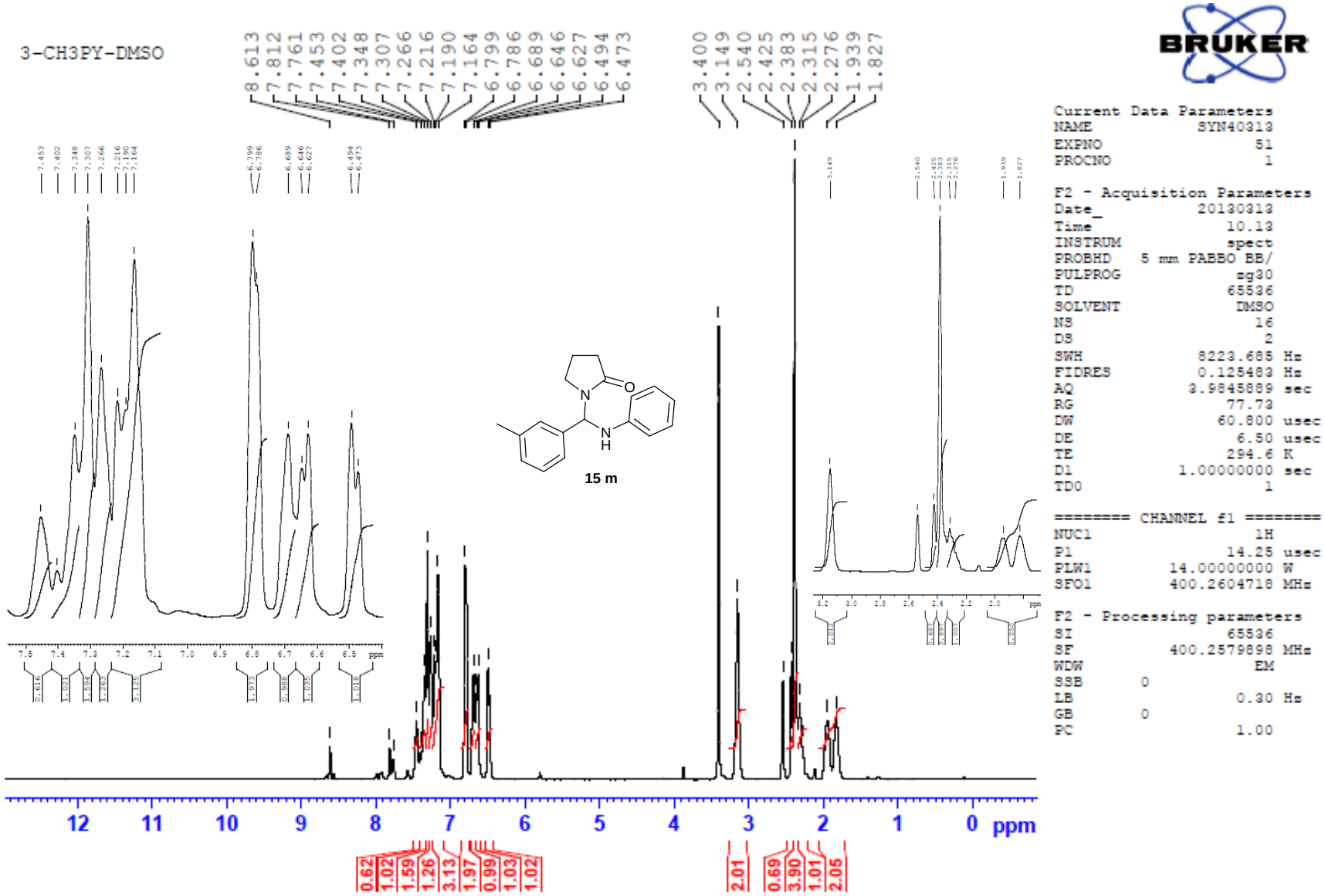



```
Current Data Parameters
NAME                 SYN40313
EXPNO                      67
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130319
Time                    1.04
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       512
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                      63.11
DW                     20.800 usec
DE                      6.50 usec
TE                     294.5 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
TD0                         1
SFO1             100.6550162 MHz
NUC1                      13C
P1                       9.80 usec
PLW1               58.00000000 W
SFO2             400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                       32768
SF               100.6450016 MHz
WDW                         EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

^{1}H NMR- 1-((phenylamino)(m-tolyl)methyl)pyrrolidin-2-one (**15m**)



BRUKER

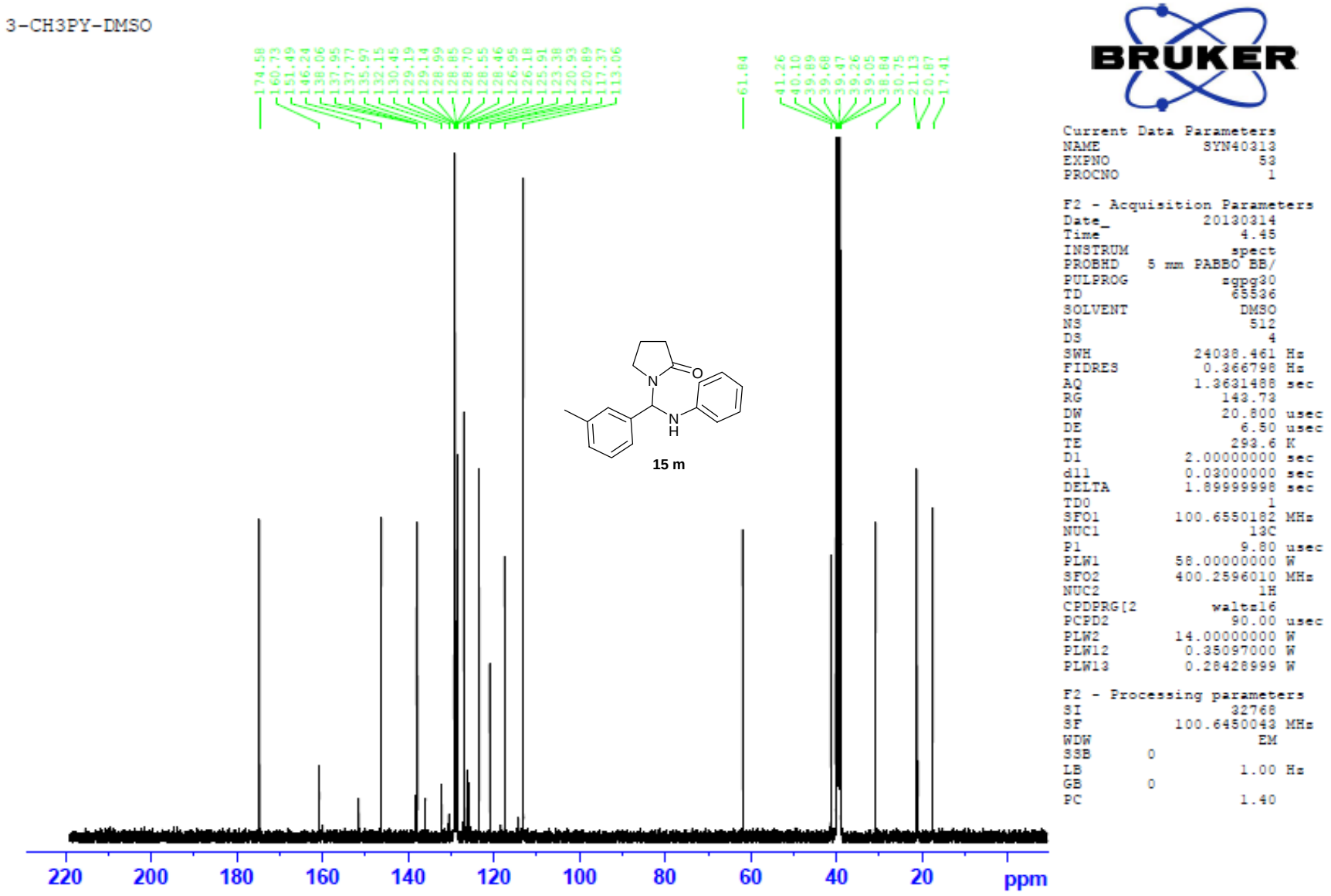
```
Current Data Parameters
NAME                  SYN40313
EXPNO                       51
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130313
Time                     10.13
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845889 sec
RG                        77.73
DW                       60.800 usec
DE                        6.50 usec
TE                       294.6 K
D1                1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1             14.00000000 W
SFO1             400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                400.2579898 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

C^{13} NMR- 1-((phenylamino)(m-tolyl)methyl)pyrrolidin-2-one (**15m**)



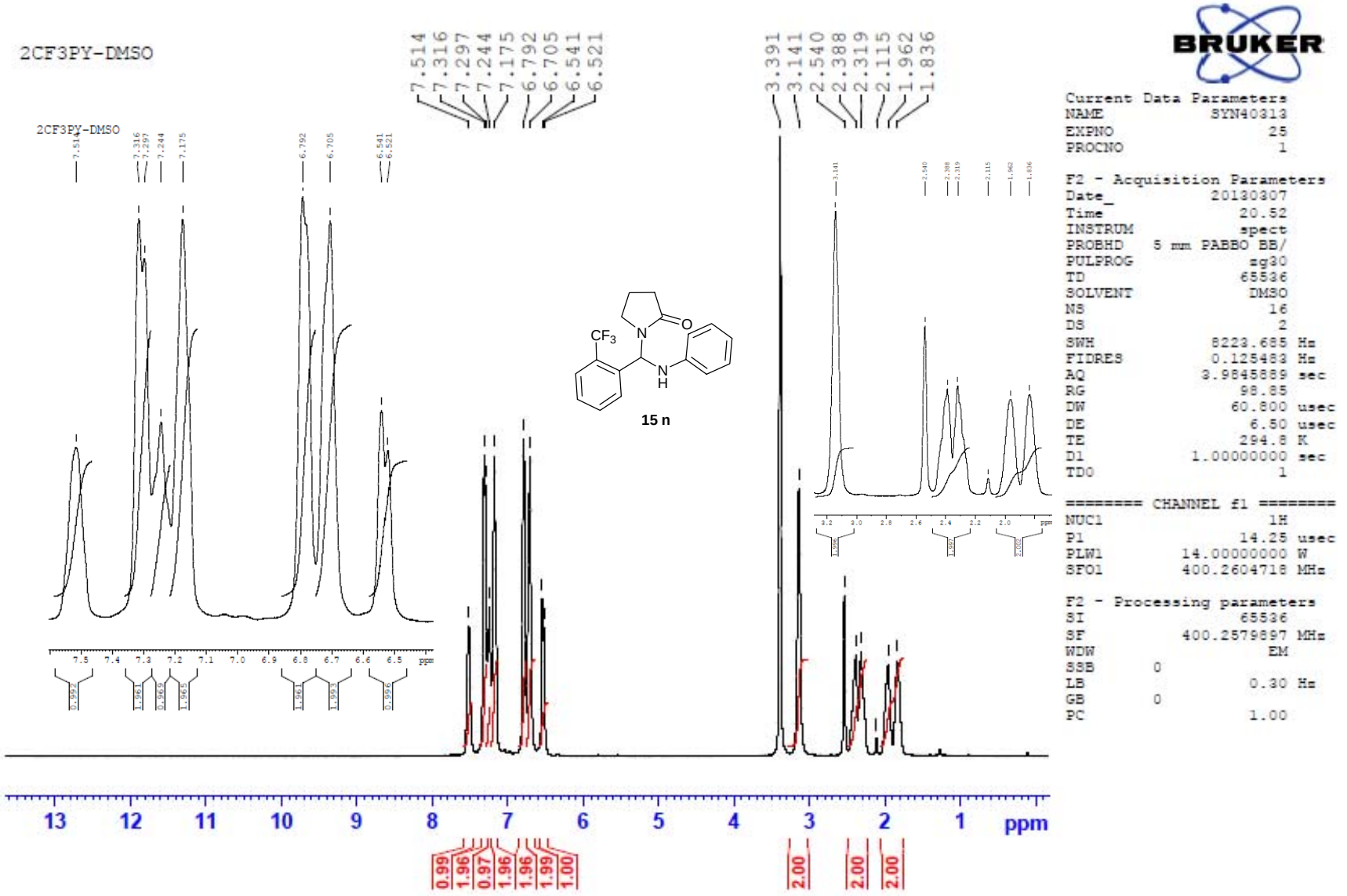
BRUKER

```
Current Data Parameters
NAME            SYN40313
EXPNO                 53
PROCNO                 1

F2 - Acquisition Parameters
Date_           20130314
Time                4.45
INSTRUM            spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT            DMSO
NS                   512
DS                     4
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631488 sec
RG                143.73
DW                20.800 usec
DE                 6.50 usec
TE                293.6 K
D1              2.00000000 sec
d11             0.03000000 sec
DELTA           1.89999998 sec
TD0                    1
SFO1          100.6550182 MHz
NUC1                 13C
P1                  9.80 usec
PLW1           58.00000000 W
SFO2          400.2596010 MHz
NUC2                 1H
CPDPRG[2          waltz16
PCPD2              90.00 usec
PLW2           14.00000000 W
PLW12           0.35097000 W
PLW13           0.28428999 W

F2 - Processing parameters
SI                  32768
SF            100.6450043 MHz
WDW                    EM
SSB       0
LB                  1.00 Hz
GB        0
PC                  1.40
```

^{1}H NMR- 1-((phenylamino)(2-(trifluoromethyl)phenyl)methyl)pyrrolidin-2-one (**15n**)



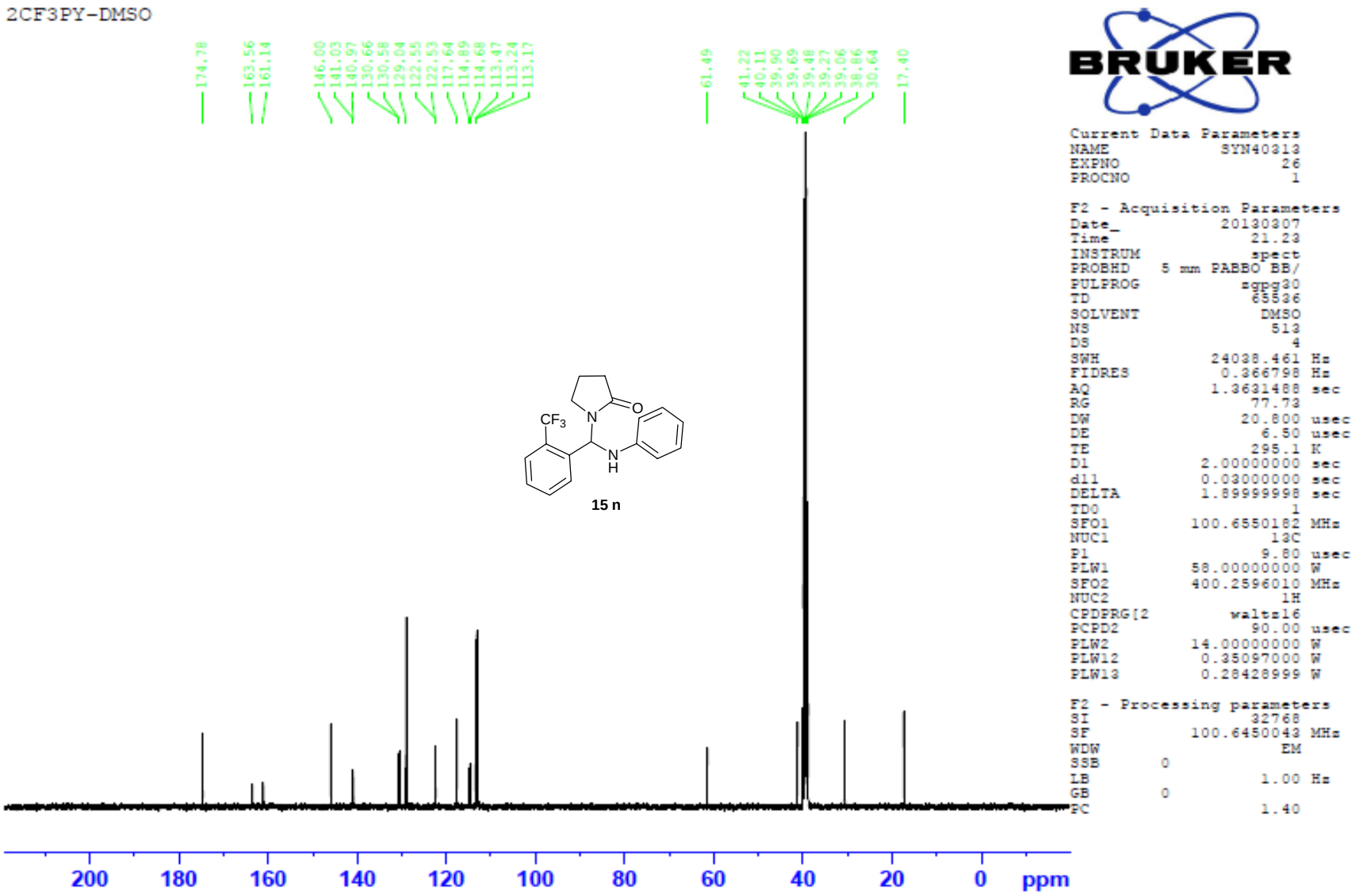

```
Current Data Parameters
NAME                  SYN40313
EXPNO                       25
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130307
Time                    20.52
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      98.85
DW                     60.800 usec
DE                      6.50 usec
TE                     294.8 K
D1                  1.00000000 sec
TD0                          1

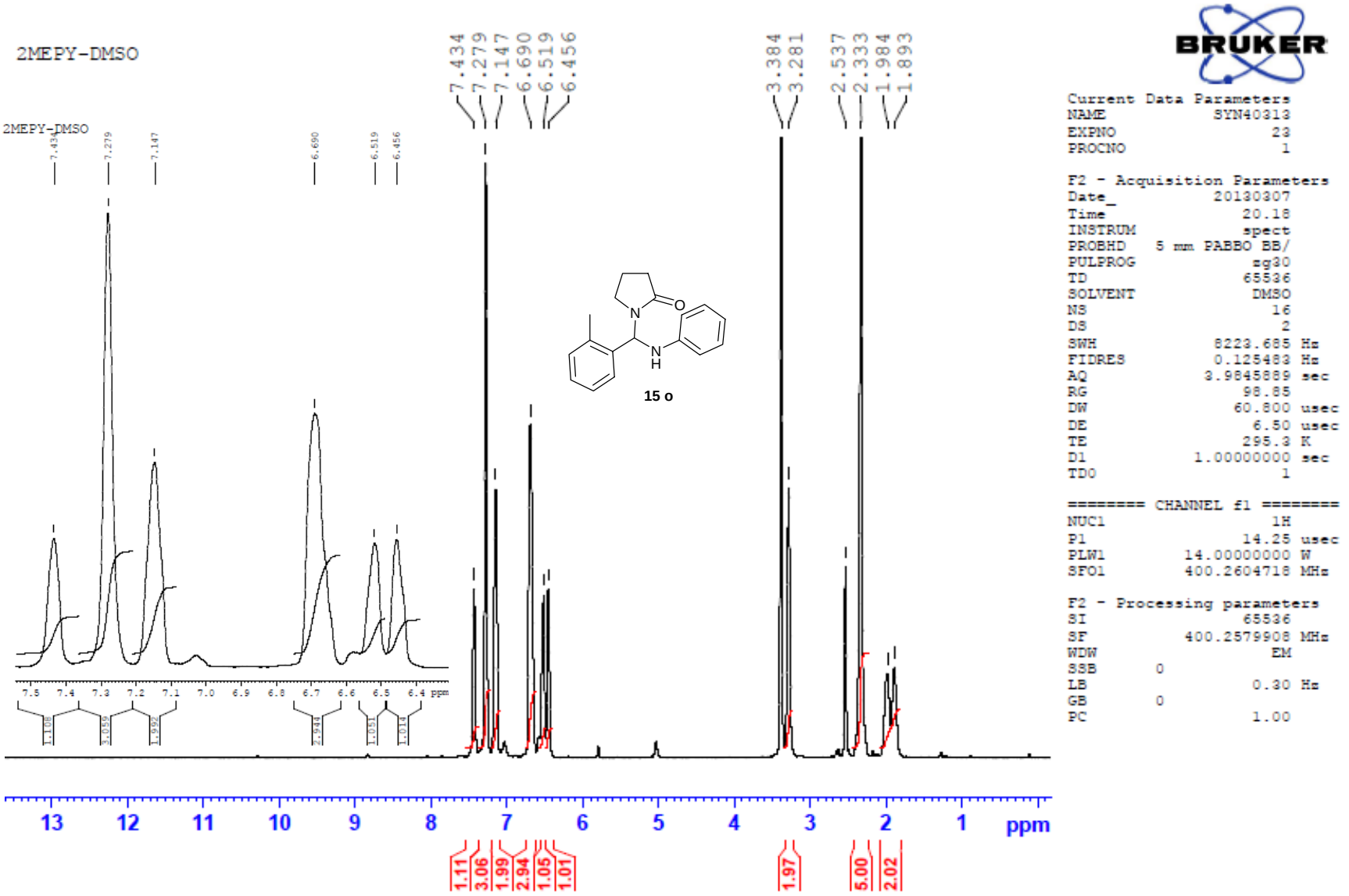
========== CHANNEL f1 =========
NUC1                        1H
P1                       14.25 usec
PLW1           14.00000000 W
SFO1           400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF             400.2579897 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

C^{13} NMR- 1-((phenylamino)(2-(trifluoromethyl)phenyl)methyl)pyrrolidin-2-one (**15n**)



^{1}H NMR- 1-((phenylamino)(o-tolyl)methyl)pyrrolidin-2-one (**15o**)



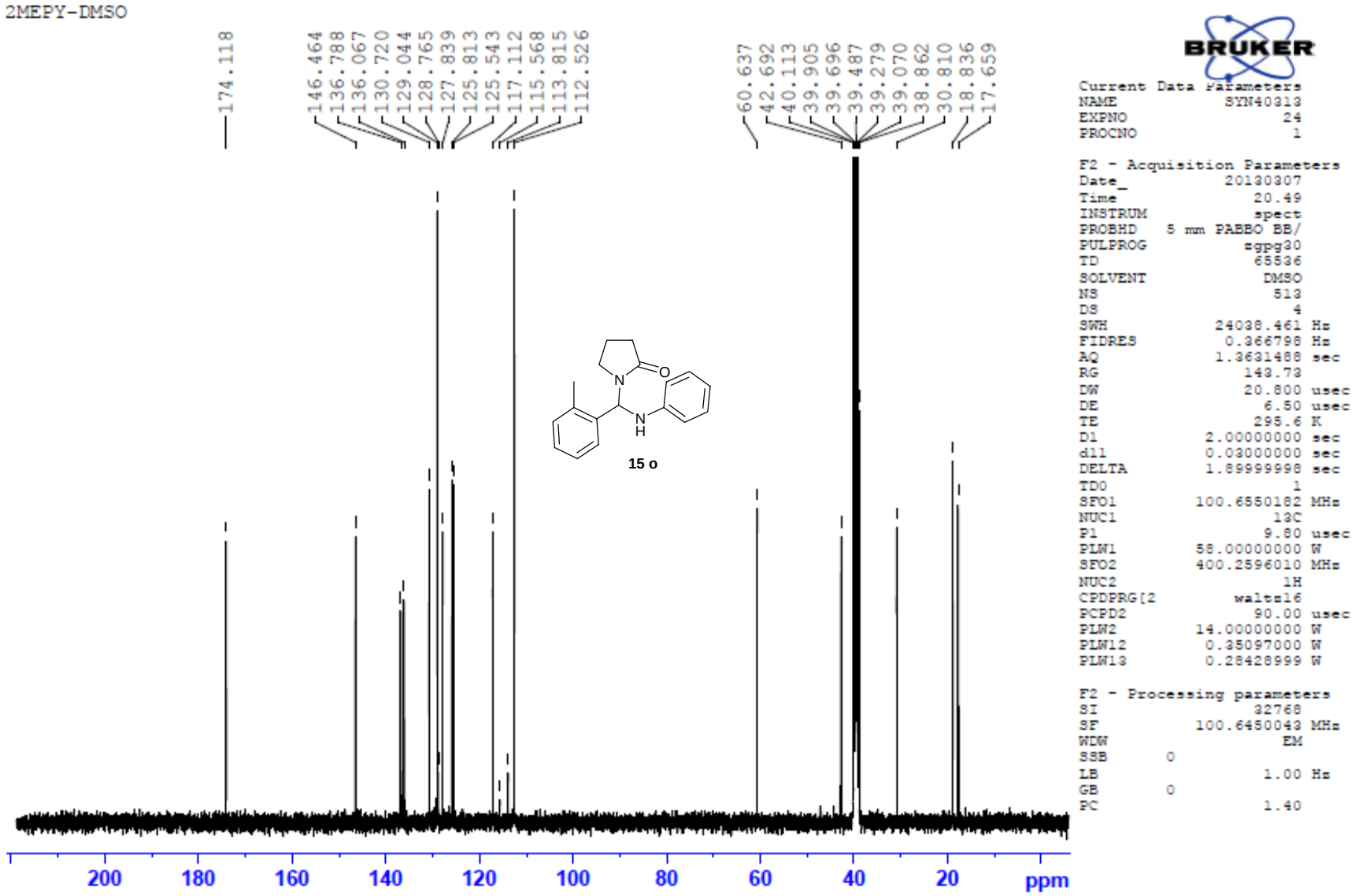

```
Current Data Parameters
NAME                  SYN40313
EXPNO                       23
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130307
Time                     20.18
INSTRUM                  spect
PROBHD     5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                  8223.685 Hz
FIDRES               0.125483 Hz
AQ                   3.9845889 sec
RG                       98.85
DW                      60.800 usec
DE                       6.50 usec
TE                      295.3 K
D1                   1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1            14.00000000 W
SFO1            400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                400.2579908 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

C^{13} NMR- 1-((phenylamino)(o-tolyl)methyl)pyrrolidin-2-one (**15o**)

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Current Data Parameters
NAME                  SYN40313
EXPNO                       24
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130307
Time                     20.49
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                   DMSO
NS                         513
DS                           4
SWH                  24038.461 Hz
FIDRES                0.366798 Hz
AQ                    1.3631488 sec
RG                       143.73
DW                       20.800 usec
DE                        6.50 usec
TE                       295.6 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
TD0                          1
SFO1                100.6550182 MHz
NUC1                        13C
P1                        9.80 usec
PLW1                58.00000000 W
SFO2                400.2596010 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                       32768
SF                  100.6450043 MHz
WDW                         EM
SSB          0
LB                        1.00 Hz
GB           0
PC                        1.40
```
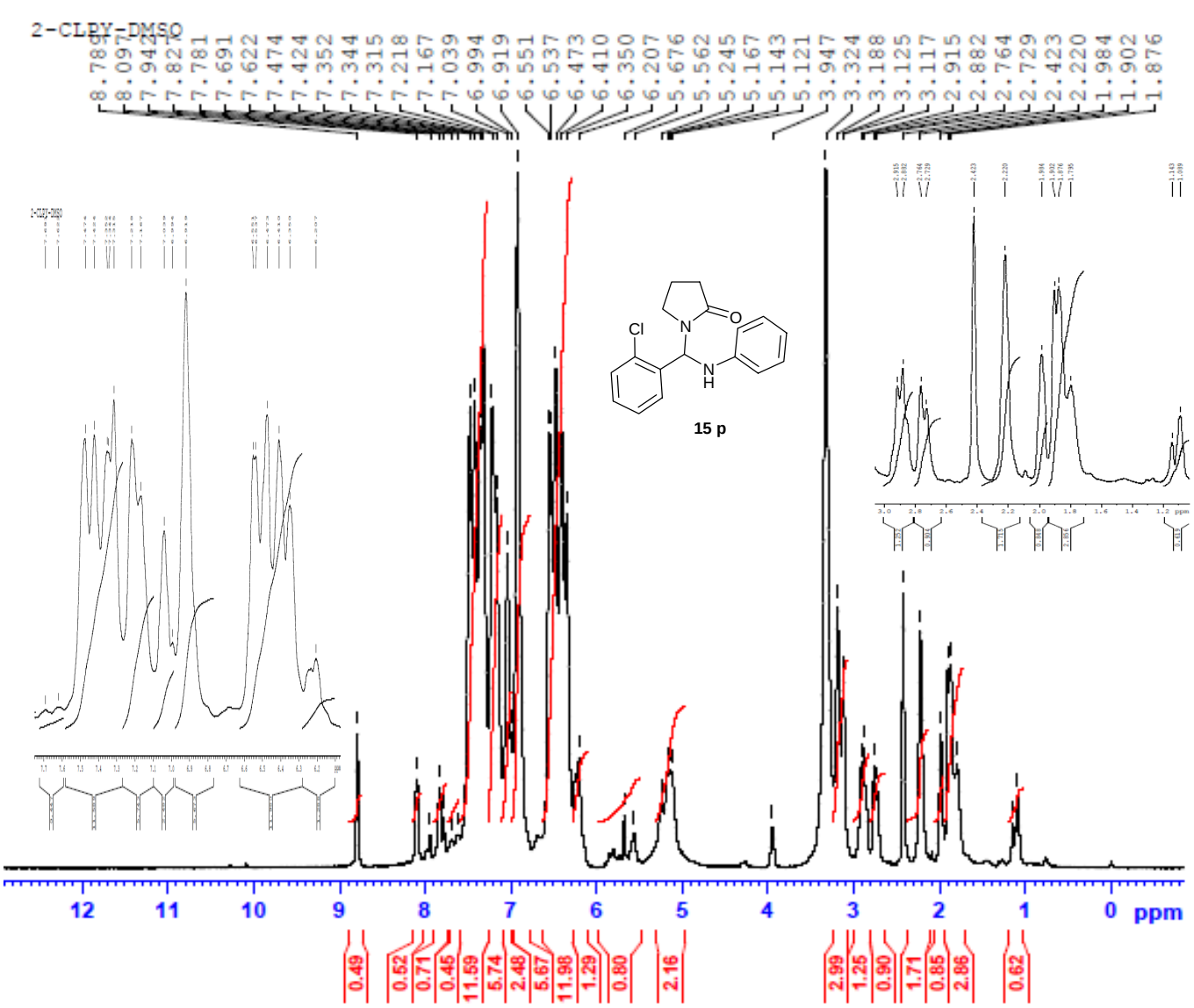

^{1}H NMR- 1-((2-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15p**)

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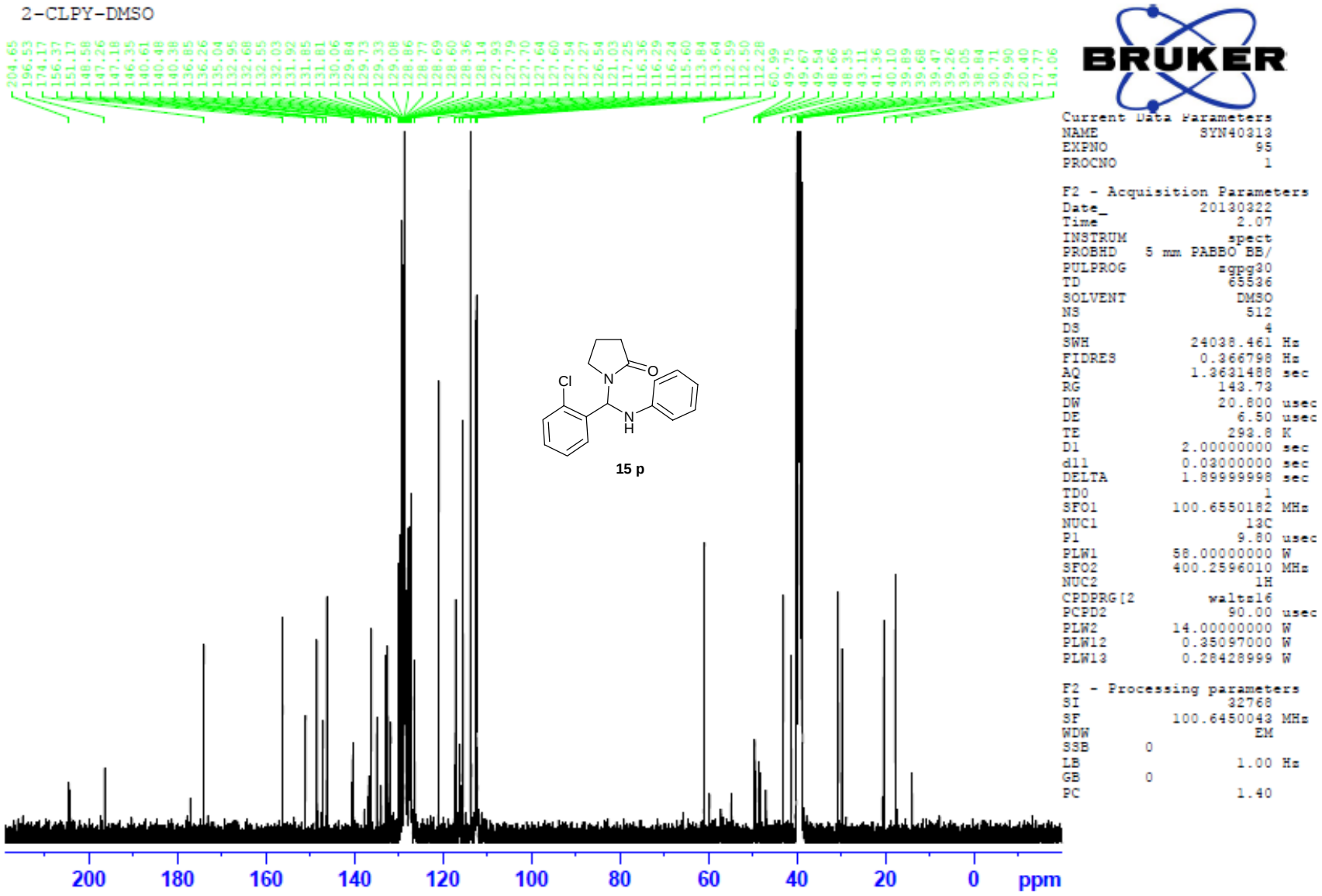
Current Data Parameters
NAME                  SYN40313
EXPNO                       94
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130322
Time                      1.37
INSTRUM                  spect
PROBHD     5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                          16
DS                           2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845889 sec
RG                        35.49
DW                       60.800 usec
DE                        6.50 usec
TE                       293.1 K
D1                    1.00000000 sec
TD0                          1

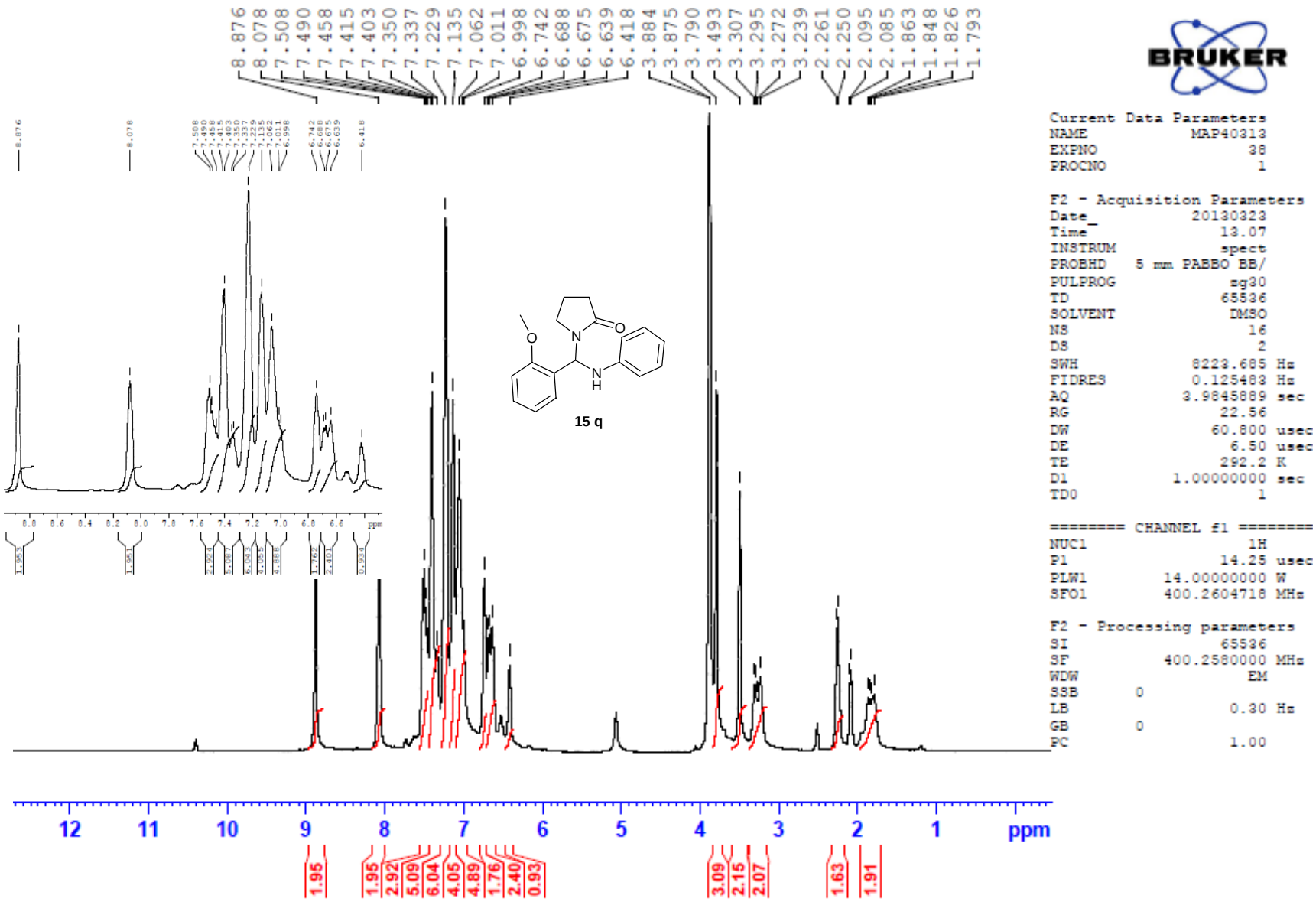
======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1          14.00000000 W
SFO1          400.2604718 MHz

F2 - Processing parameters
SI                       65536
SF            400.2580360 MHz
WDW                         EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

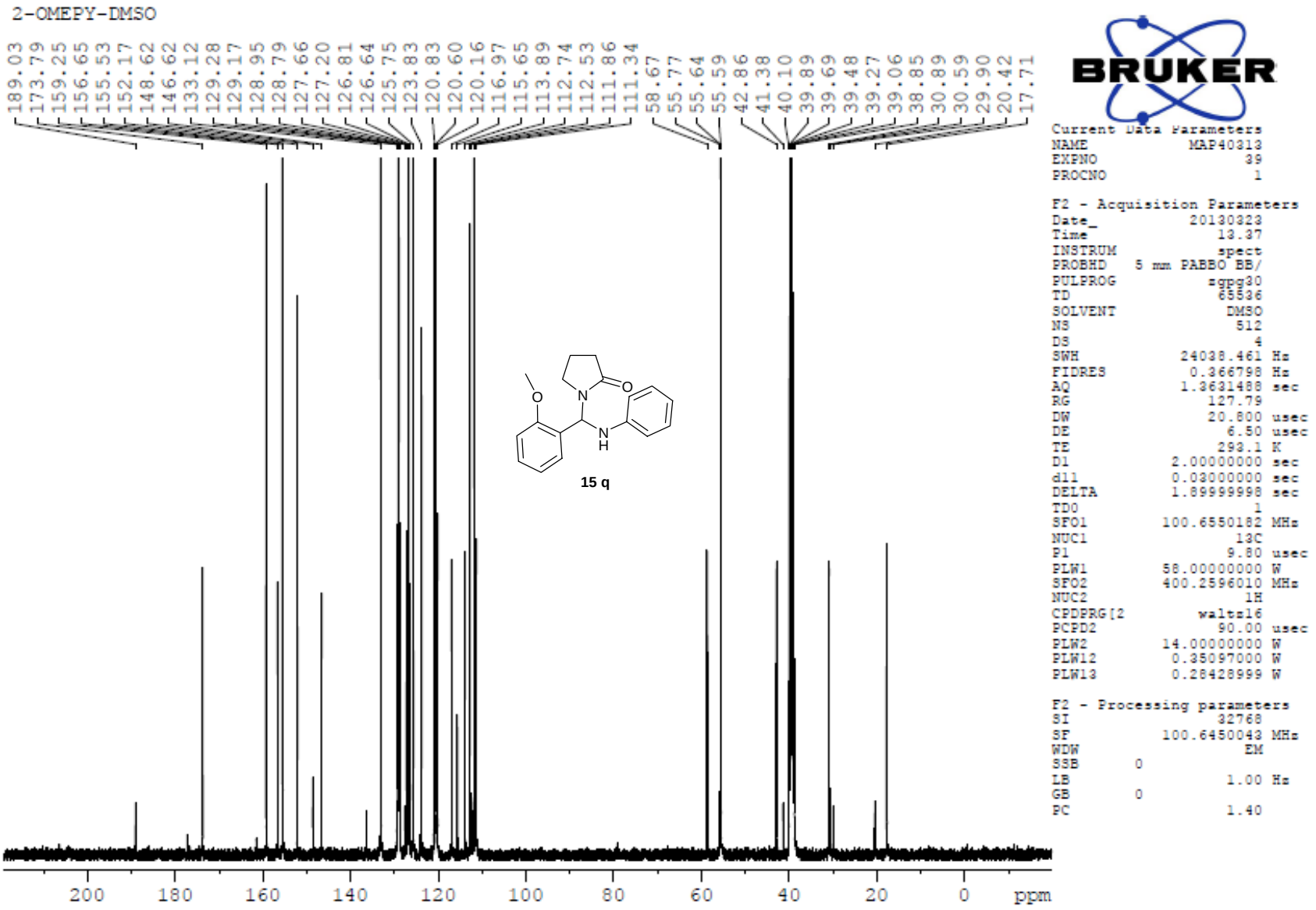
C^{13} NMR- 1-((2-chlorophenyl)(phenylamino)methyl)pyrrolidin-2-one (**15p**)



^{1}H NMR- 1-((2-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15q**)



C^{13} NMR- 1-((2-methoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15q**)



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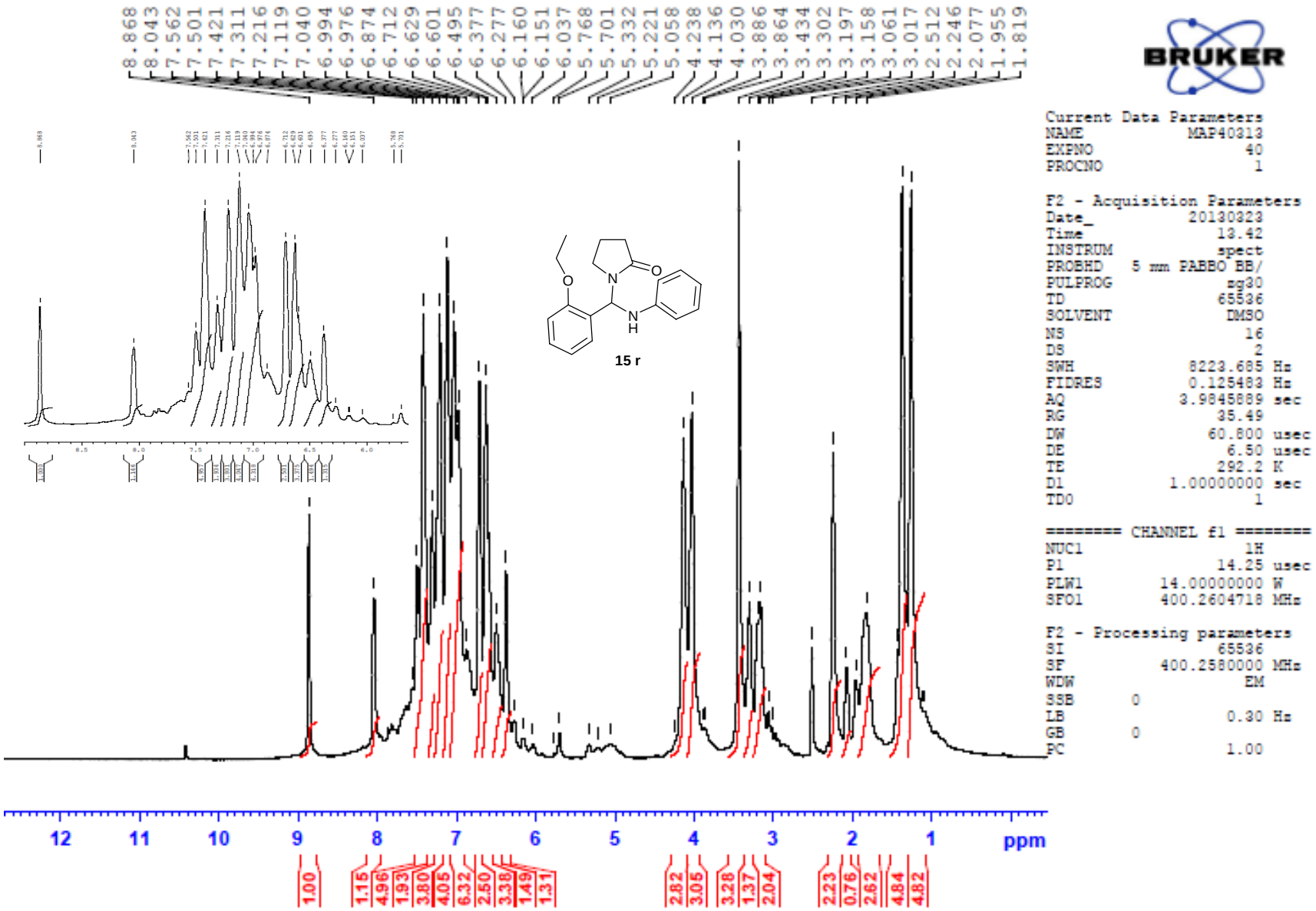
```
Current Data Parameters
NAME              MAP40313
EXPNO                   39
PROCNO                   1

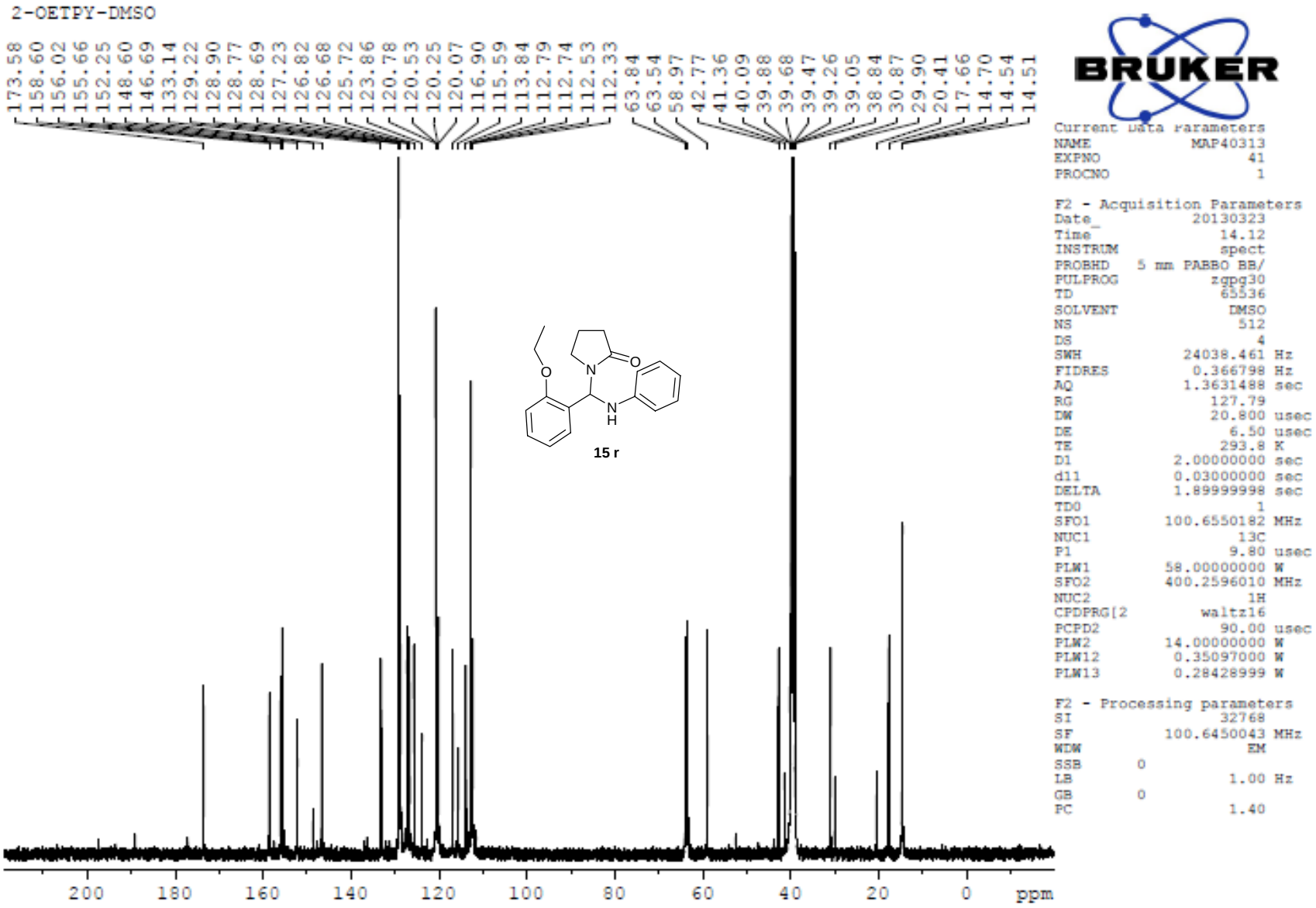
F2 - Acquisition Parameters
Date_              20130323
Time                 13.37
INSTRUM              spect
PROBHD    5 mm PABBO BB/
PULPROG            zgpg30
TD                  65536
SOLVENT              DMSO
NS                     512
DS                       4
SWH              24038.461 Hz
FIDRES            0.366798 Hz
AQ                1.3631488 sec
RG                   127.79
DW                  20.800 usec
DE                   6.50 usec
TE                  293.1 K
D1               2.00000000 sec
d11              0.03000000 sec
DELTA            1.89999998 sec
TD0                      1
SFO1           100.6550182 MHz
NUC1                   13C
P1                    9.80 usec
PLW1            58.00000000 W
SFO2           400.2596010 MHz
NUC2                   1H
CPDPRG[2           waltz16
PCPD2                90.00 usec
PLW2            14.00000000 W
PLW12            0.35097000 W
PLW13            0.28428999 W

F2 - Processing parameters
SI                   32768
SF             100.6450043 MHz
WDW                     EM
SSB       0
LB                    1.00 Hz
GB        0
PC                    1.40
```

^{1}H NMR- 1-((2-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15r**)



C^{13} NMR- 1-((2-ethoxyphenyl)(phenylamino)methyl)pyrrolidin-2-one (**15r**)



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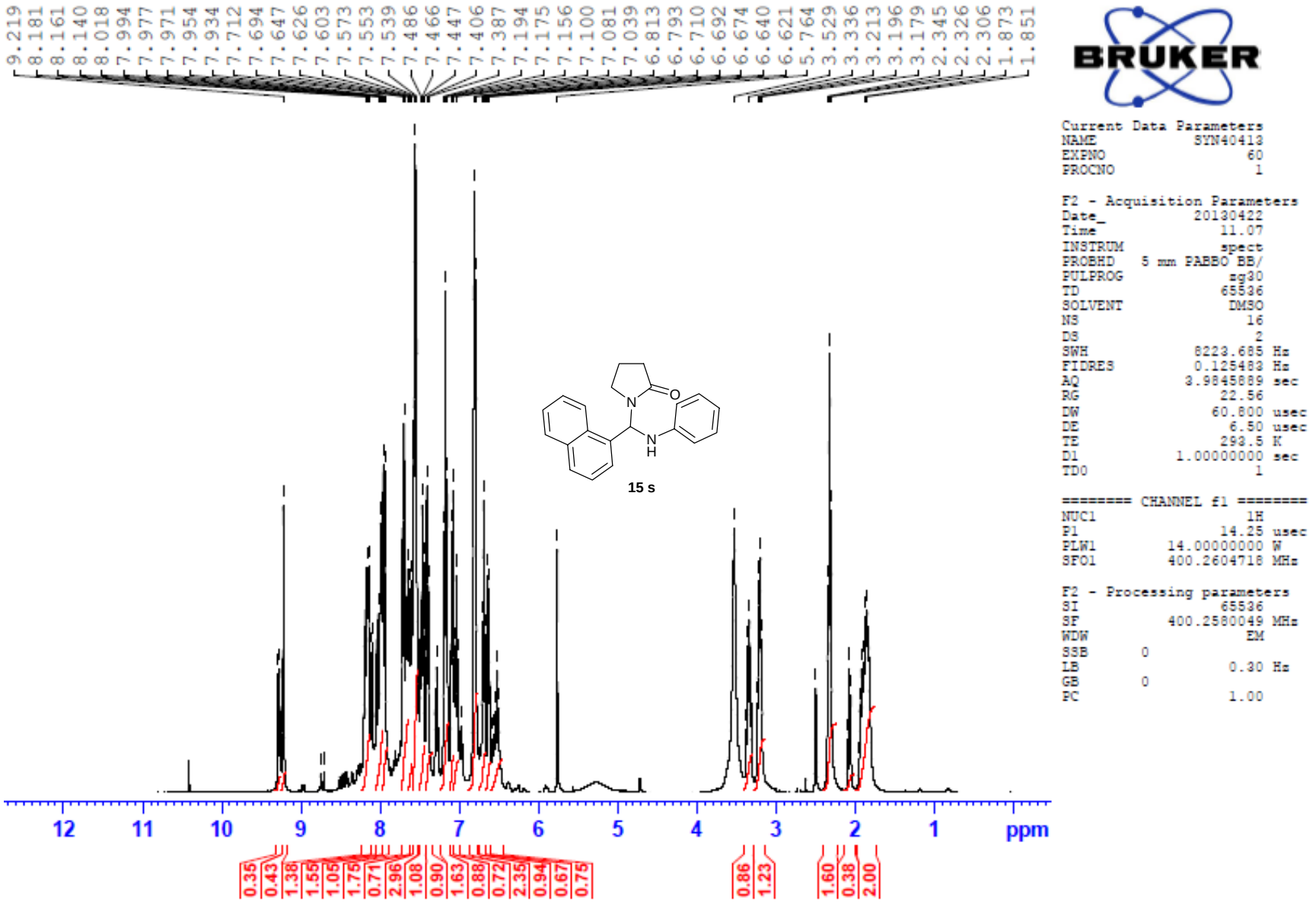
```
Current Data Parameters
NAME                  MAP40313
EXPNO                       41
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130323
Time                     14.12
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                  DMSO
NS                         512
DS                           4
SWH                  24038.461 Hz
FIDRES                0.366798 Hz
AQ                    1.3631488 sec
RG                       127.79
DW                       20.800 usec
DE                        6.50 usec
TE                       293.8 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
TD0                          1
SFO1                100.6550182 MHz
NUC1                        13C
P1                        9.80 usec
PLW1                58.00000000 W
SFO2                400.2596010 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                14.00000000 W
PLW12                 0.35097000 W
PLW13                 0.28428999 W

F2 - Processing parameters
SI                       32768
SF                  100.6450043 MHz
WDW                         EM
SSB       0
LB                        1.00 Hz
GB        0
PC                        1.40
```

^{1}H NMR- 1-(naphthalen-1-yl(phenylamino)methyl)pyrrolidin-2-one (**15s**)

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Current Data Parameters
NAME                 SYN40413
EXPNO                      60
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130422
Time                   11.07
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                     22.56
DW                    60.800 usec
DE                     6.50 usec
TE                    293.5 K
D1                  1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.25 usec
PLW1            14.00000000 W
SFO1            400.2604718 MHz

F2 - Processing parameters
SI                        65536
SF              400.2600049 MHz
WDW                       EM
SSB          0
LB                     0.30 Hz
GB           0
PC                     1.00
```
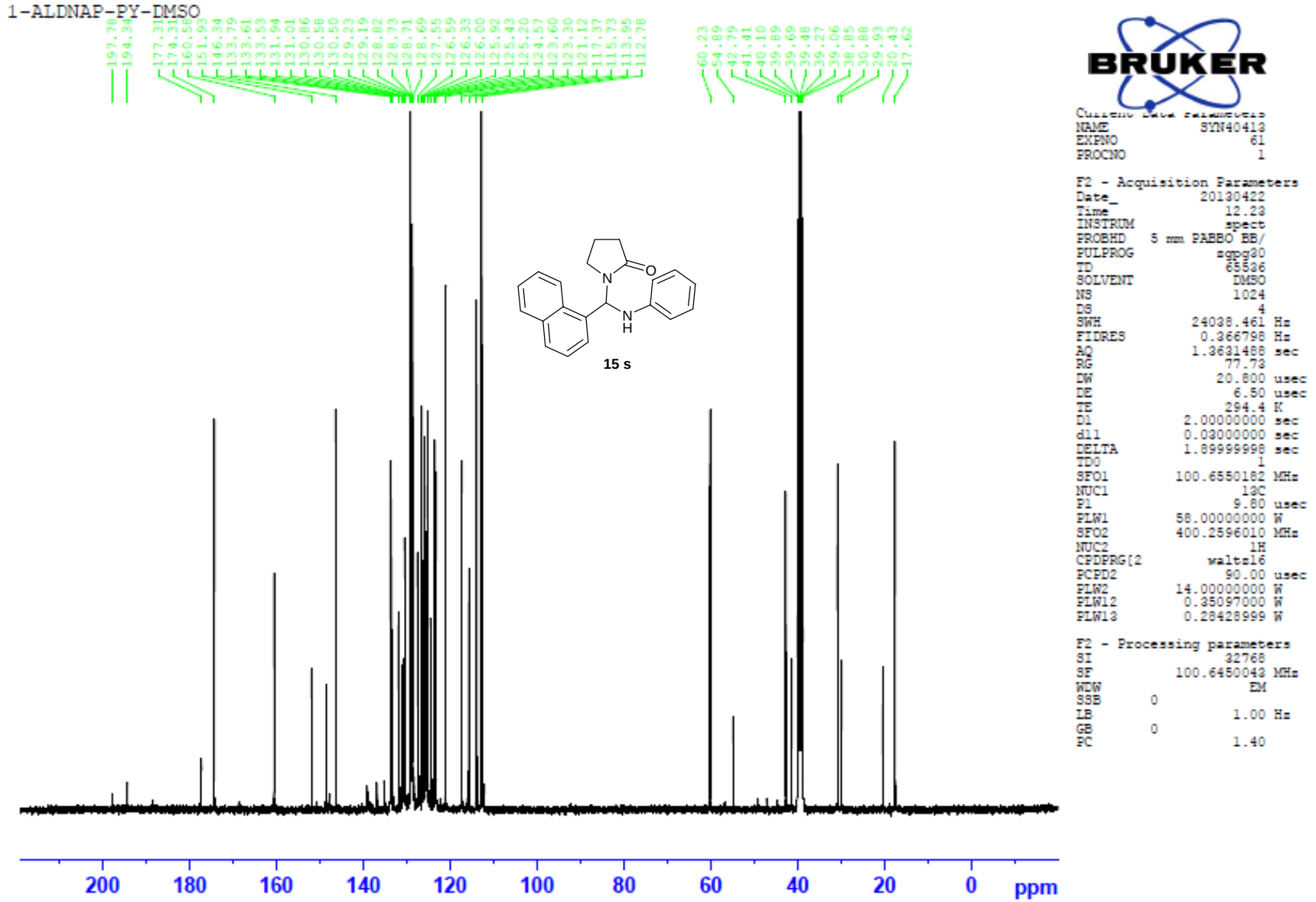

C^{13} NMR- 1-(naphthalen-1-yl(phenylamino)methyl)pyrrolidin-2-one (**15s**)



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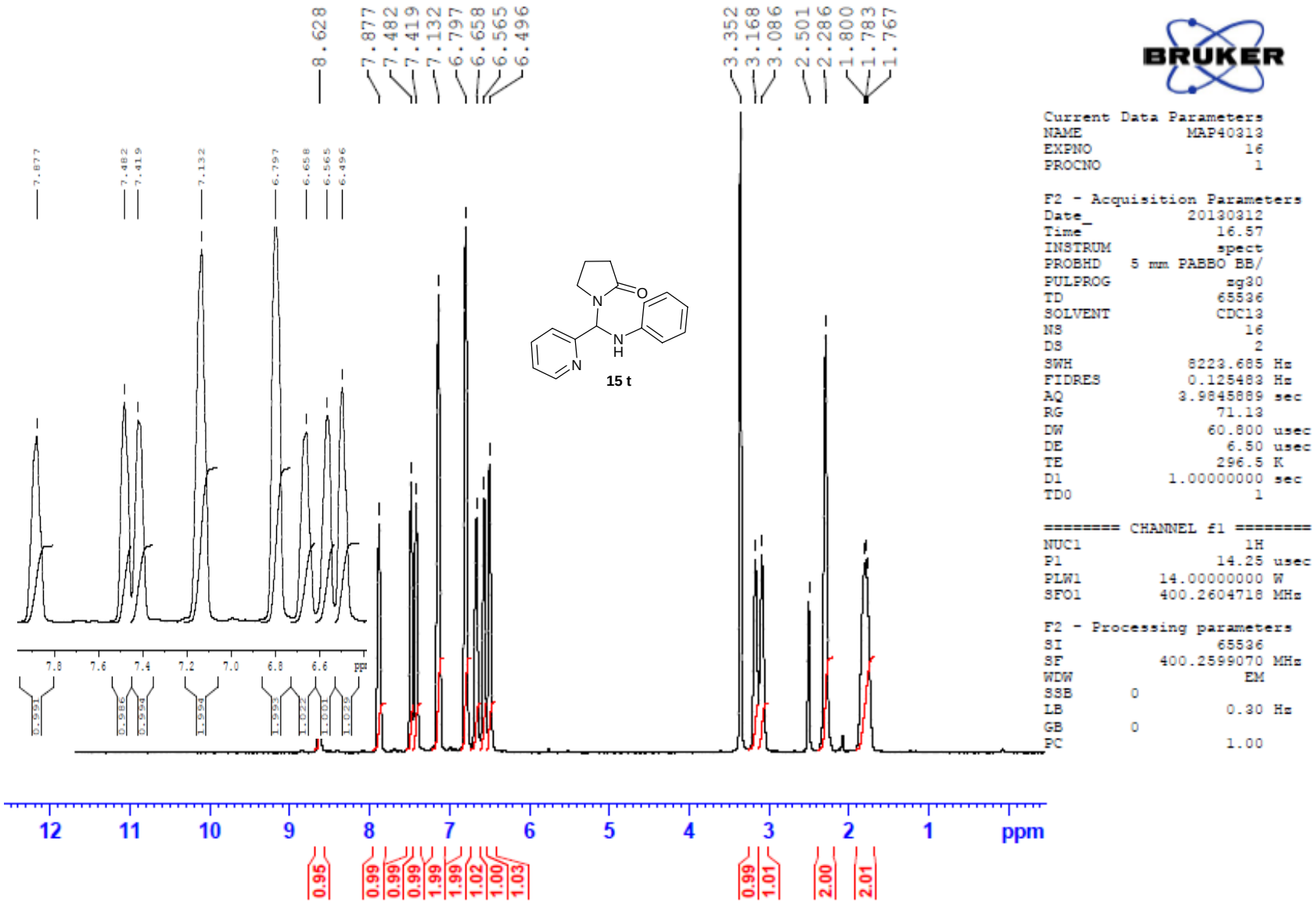
```
Current Data Parameters
NAME                 SYN40413
EXPNO                      61
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130422
Time                   12.23
INSTRUM                spect
PROBHD   5 mm PABBO BB/
PULPROG             zgpg30
TD                      65536
SOLVENT                 DMSO
NS                       1024
DS                          4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                      77.73
DW                     20.800 usec
DE                      6.50 usec
TE                     294.4 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
TD0                         1
SFO1               100.6550182 MHz
NUC1                      13C
P1                      9.80 usec
PLW1               58.00000000 W
SFO2               400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                  90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                         32768
SF                 100.6450043 MHz
WDW                        EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

^{1}H NMR- 1-((phenylamino)(pyridin-2-yl)methyl)pyrrolidin-2-one (**15t**)



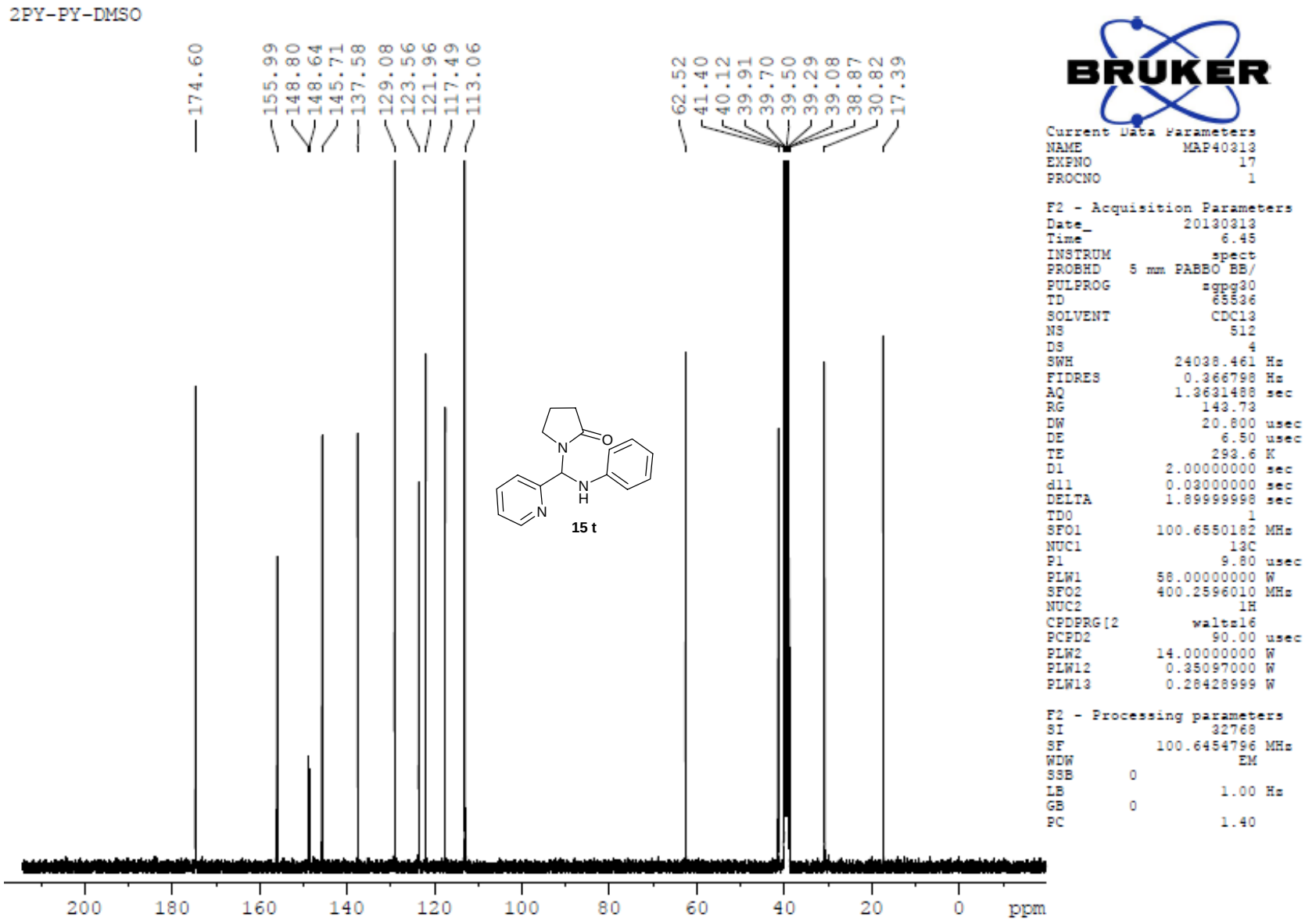

```
Current Data Parameters
NAME                  MAP40313
EXPNO                       16
PROCNO                       1

F2 - Acquisition Parameters
Date_                20130312
Time                    16.57
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                          16
DS                           2
SWH                  8223.685 Hz
FIDRES               0.125483 Hz
AQ                   3.9845889 sec
RG                       71.13
DW                      60.800 usec
DE                       6.50 usec
TE                      296.5 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1              14.00000000 W
SFO1              400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF                400.2599070 MHz
WDW                       EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

C^{13} NMR- 1-((phenylamino)(pyridin-2-yl)methyl)pyrrolidin-2-one (**15t**)



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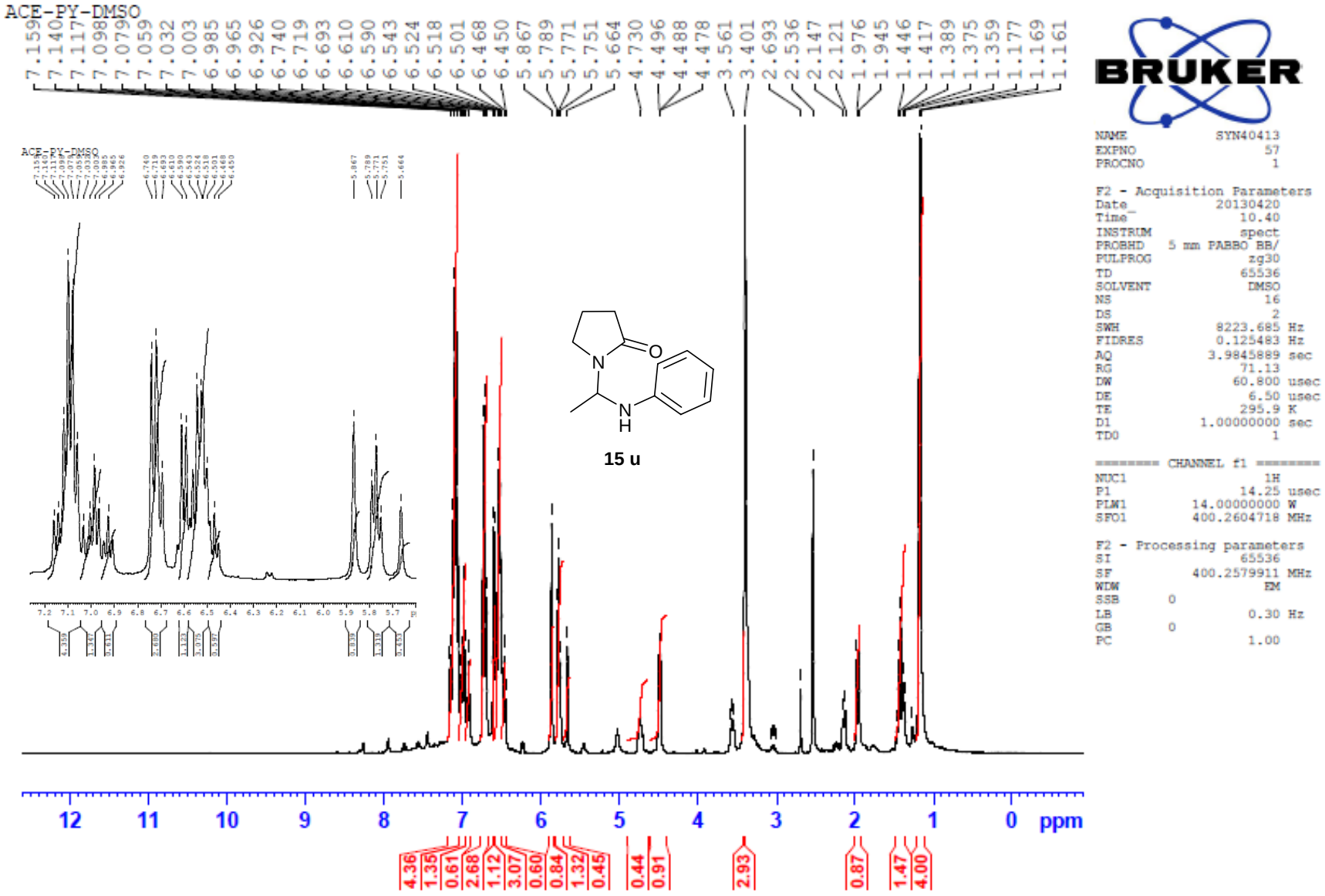
```
Current Data Parameters
NAME                  MAP40313
EXPNO                       17
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130313
Time                      6.45
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                 zgpg30
TD                       65536
SOLVENT                  CDCl3
NS                         512
DS                           4
SWH                  24038.461 Hz
FIDRES                0.366798 Hz
AQ                    1.3631488 sec
RG                       143.73
DW                       20.800 usec
DE                        6.50 usec
TE                       293.6 K
D1                    2.00000000 sec
d11                   0.03000000 sec
DELTA                 1.89999998 sec
TD0                          1
SFO1                100.6550182 MHz
NUC1                        13C
P1                        9.80 usec
PLW1                58.00000000 W
SFO2                400.2596010 MHz
NUC2                        1H
CPDPRG[2                waltz16
PCPD2                    90.00 usec
PLW2                14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                       32768
SF                  100.6454796 MHz
WDW                         EM
SSB          0
LB                        1.00 Hz
GB           0
PC                        1.40
```

^{1}H NMR- 1-(1-(phenylamino)ethyl)pyrrolidin-2-one (**15u**)



BRUKER

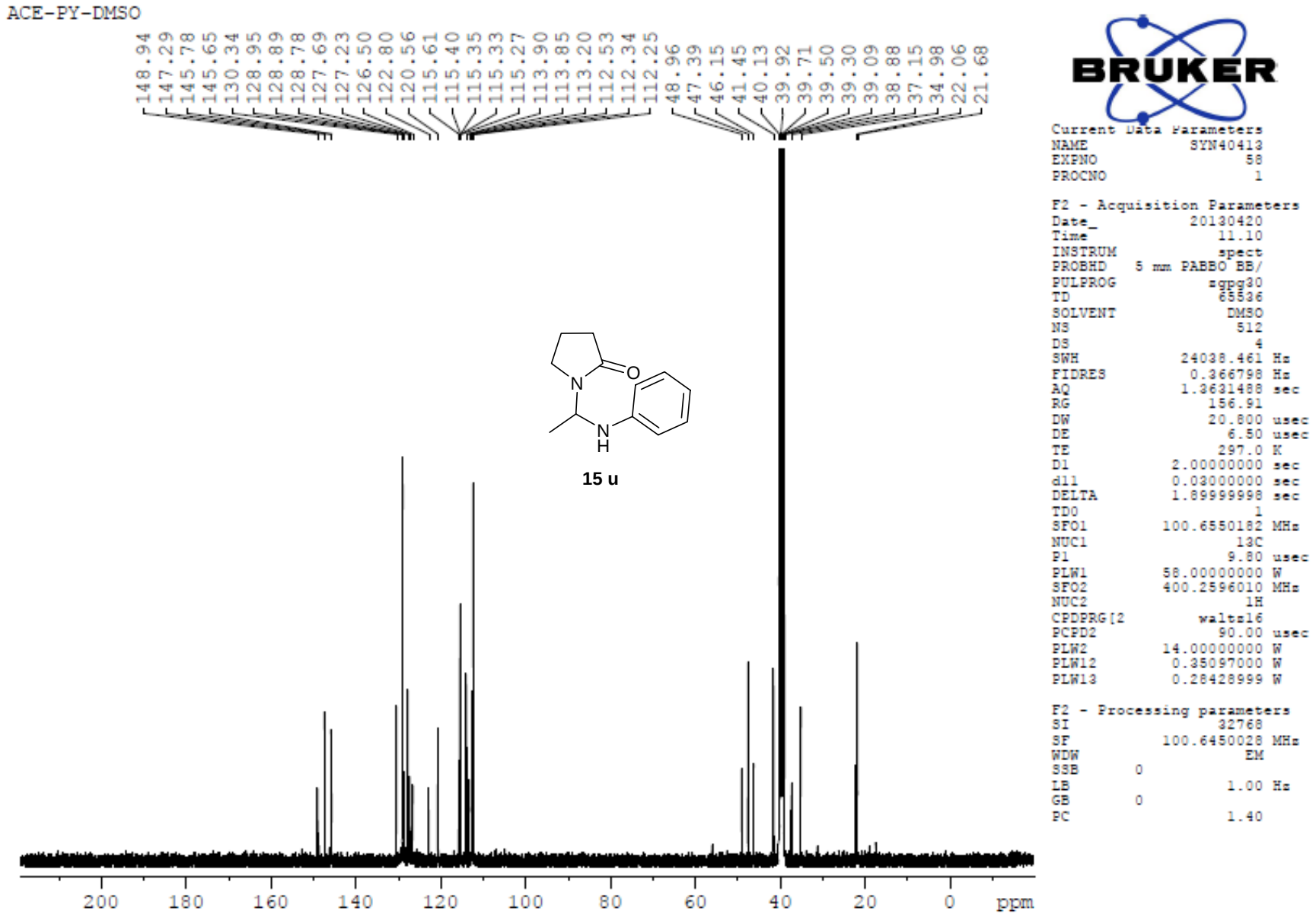
```
NAME                SYN40413
EXPNO                     57
PROCNO                     1

F2 - Acquisition Parameters
Date_              20130420
Time                  10.40
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zg30
TD                    65536
SOLVENT                DMSO
NS                        16
DS                         2
SWH                8223.685 Hz
FIDRES            0.125483 Hz
AQ                3.9845889 sec
RG                    71.13
DW                   60.800 usec
DE                    6.50 usec
TE                   295.9 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                      1H
P1                     14.25 usec
PLW1          14.00000000 W
SFO1          400.2604718 MHz

F2 - Processing parameters
SI                    65536
SF            400.2579911 MHz
WDW                      EM
SSB       0
LB                     0.30 Hz
GB        0
PC                     1.00
```

C^{13} NMR- 1-(1-(phenylamino)ethyl)pyrrolidin-2-one (**15u**)



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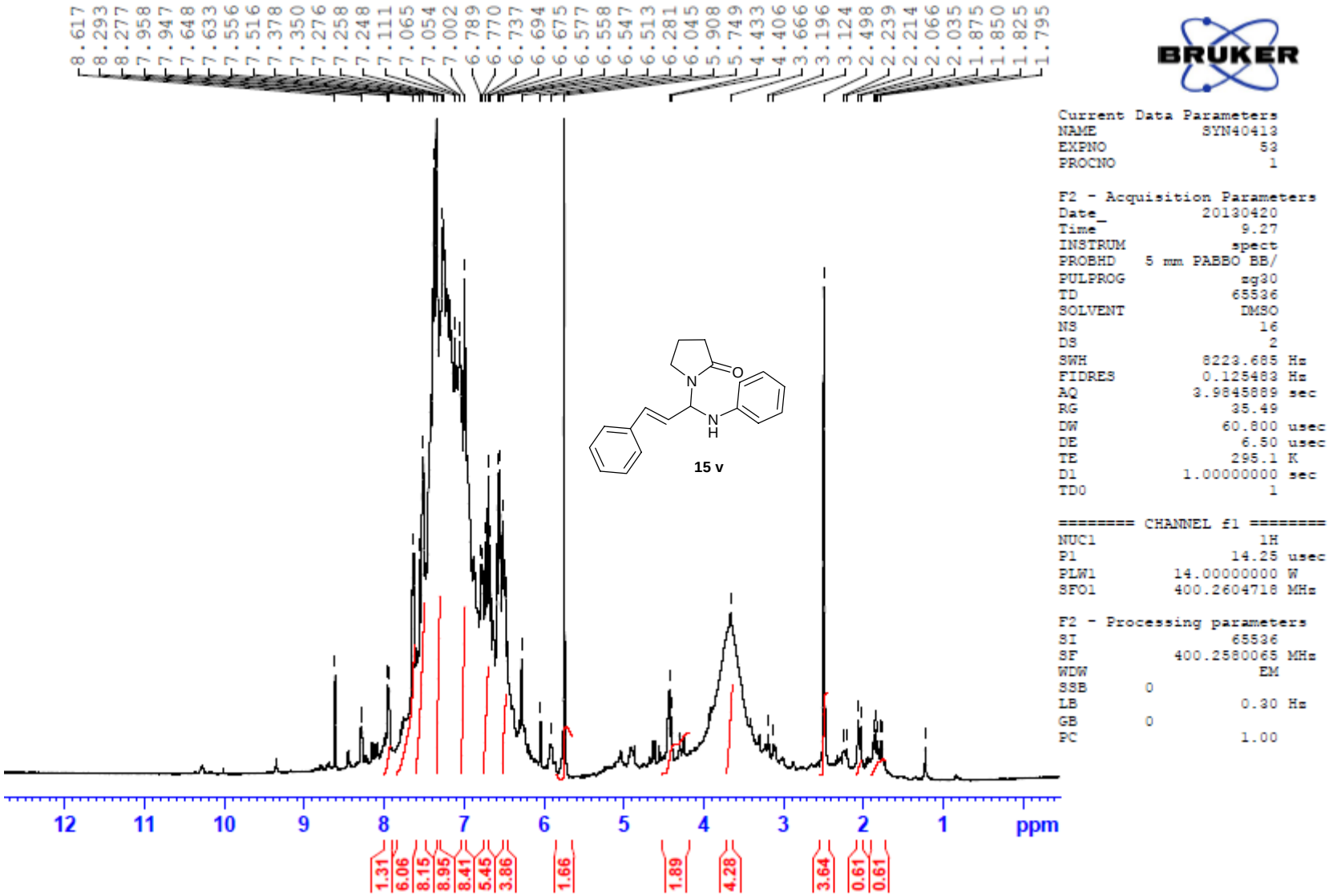
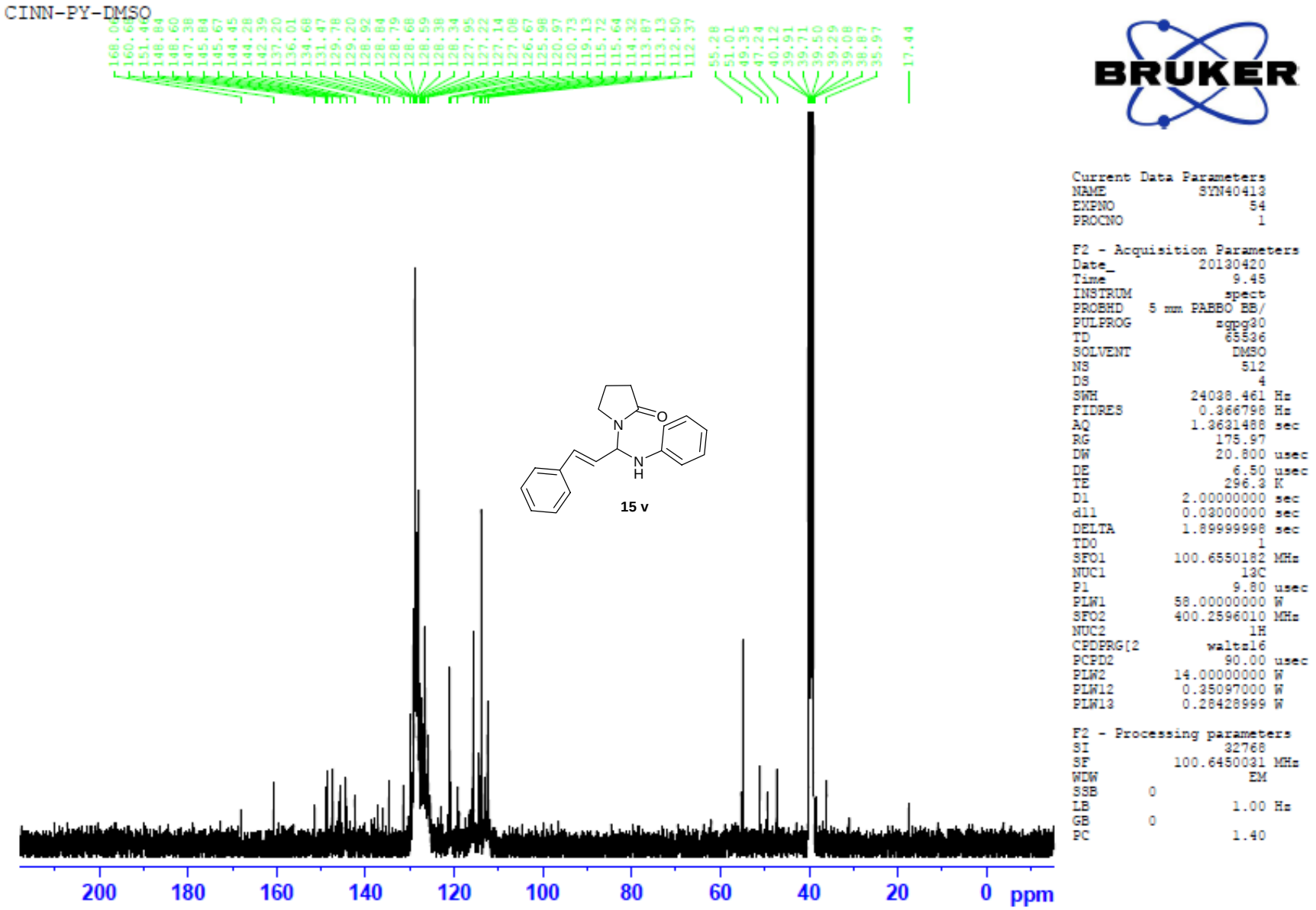
```
Current Data Parameters
NAME                 SYN40413
EXPNO                      58
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130420
Time                   11.10
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       512
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     156.91
DW                     20.800 usec
DE                      6.50 usec
TE                     297.0 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
TD0                         1
SFO1             100.6550182 MHz
NUC1                      13C
P1                      9.80 usec
PLW1              58.00000000 W
SFO2             400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                  90.00 usec
PLW2              14.00000000 W
PLW12              0.35097000 W
PLW13              0.28428999 W

F2 - Processing parameters
SI                       32768
SF               100.6450028 MHz
WDW                         EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

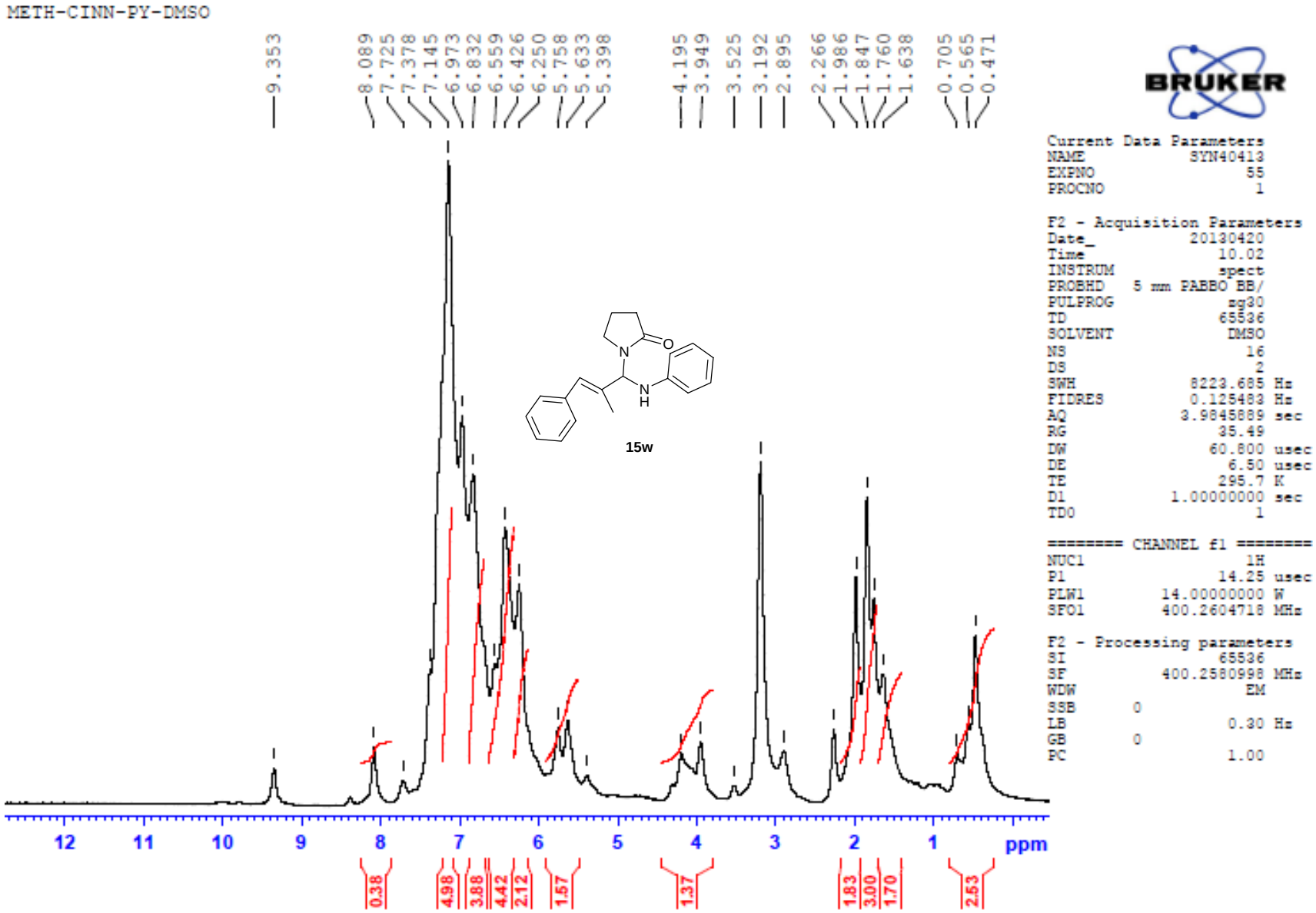
^{1}H NMR- (E)-1-(3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15v**)



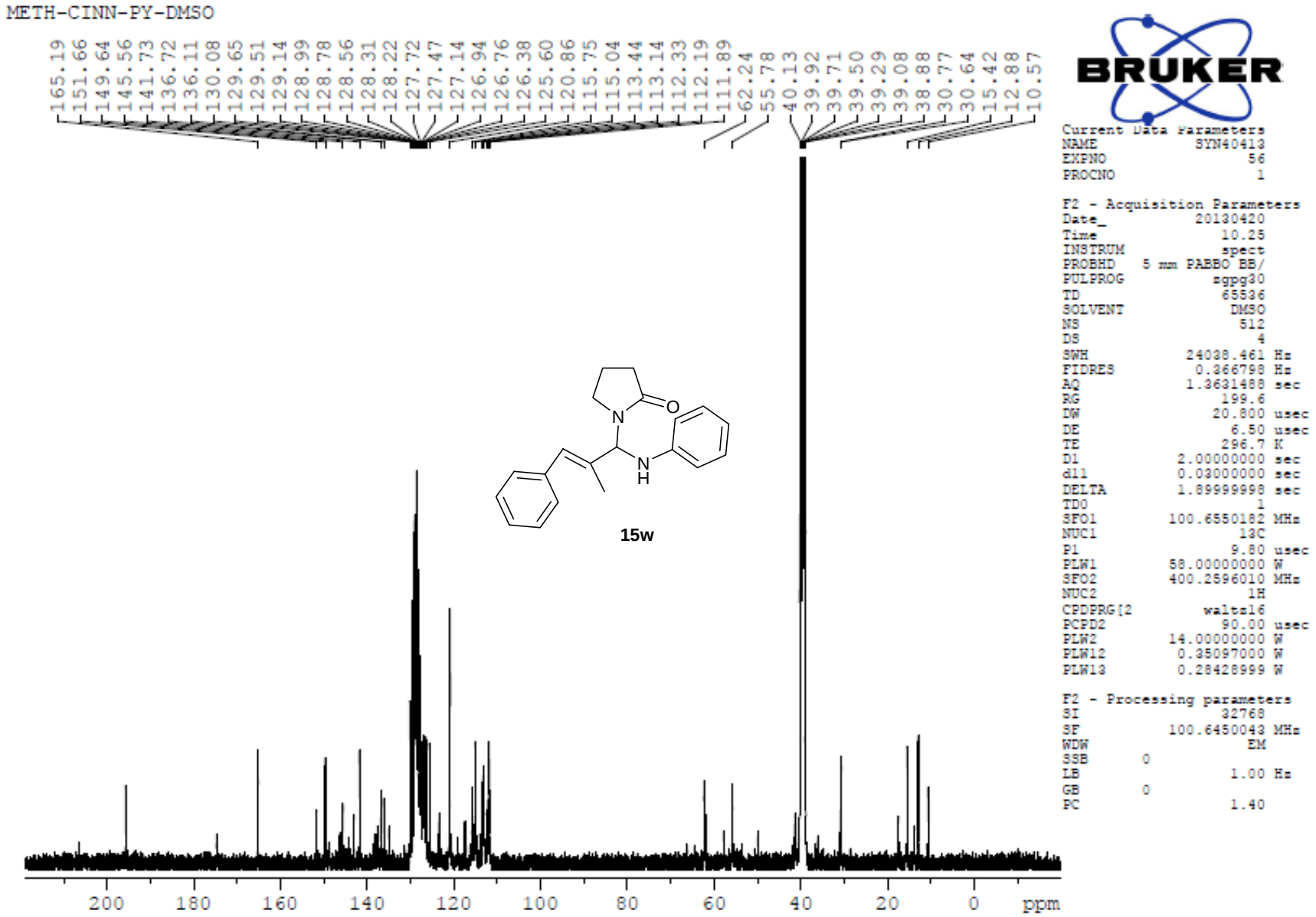
C^{13} NMR- (E)-1-(3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15v**)



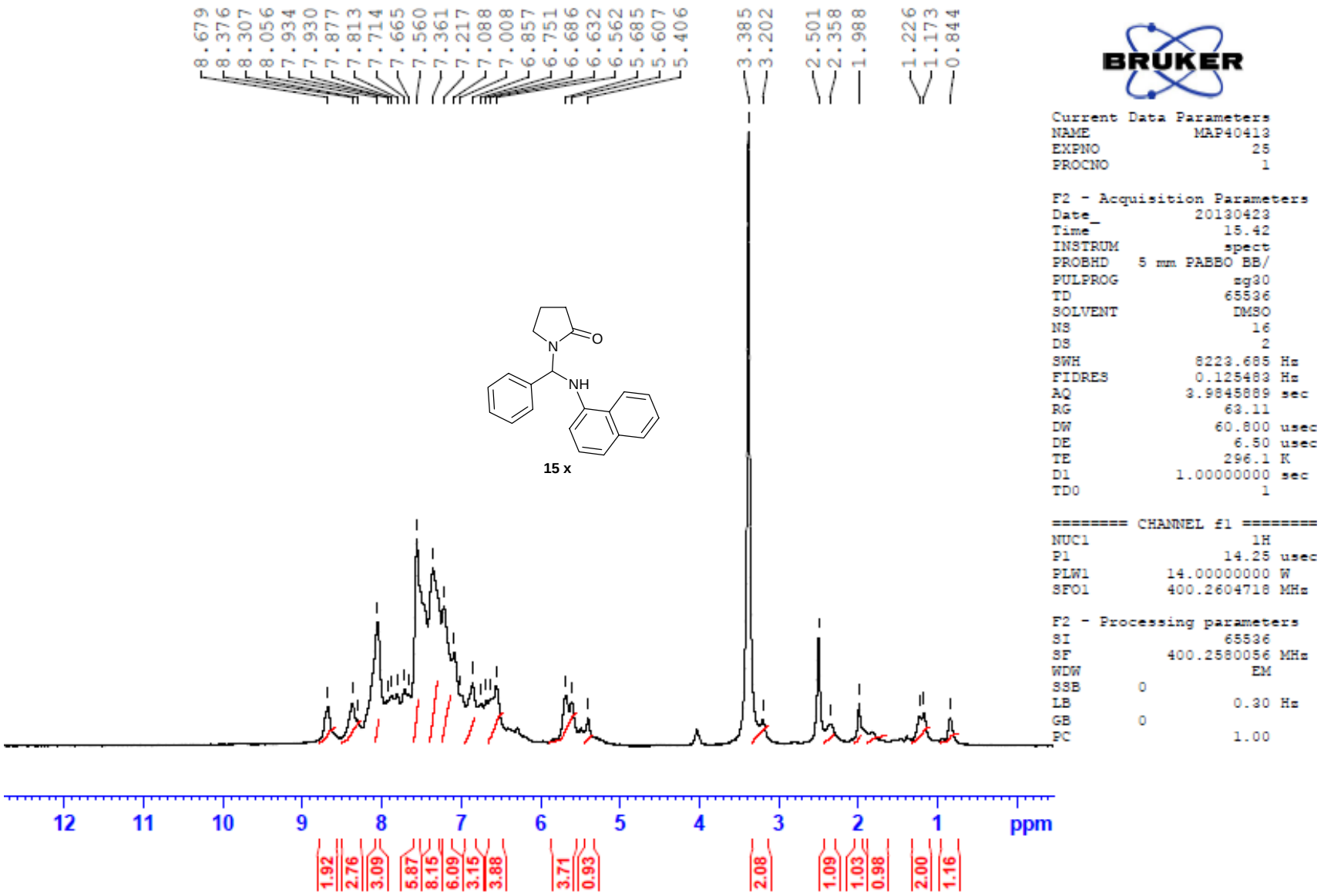
^{1}H NMR- (E)-1-(2-methyl-3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15w**)



C^{13} NMR- (E)-1-(2-methyl-3-phenyl-1-(phenylamino)allyl)pyrrolidin-2-one (**15w**)



^{1}H NMR- 1-((naphthalen-1-ylamino)(phenyl)methyl)pyrrolidin-2-one (**15x**)

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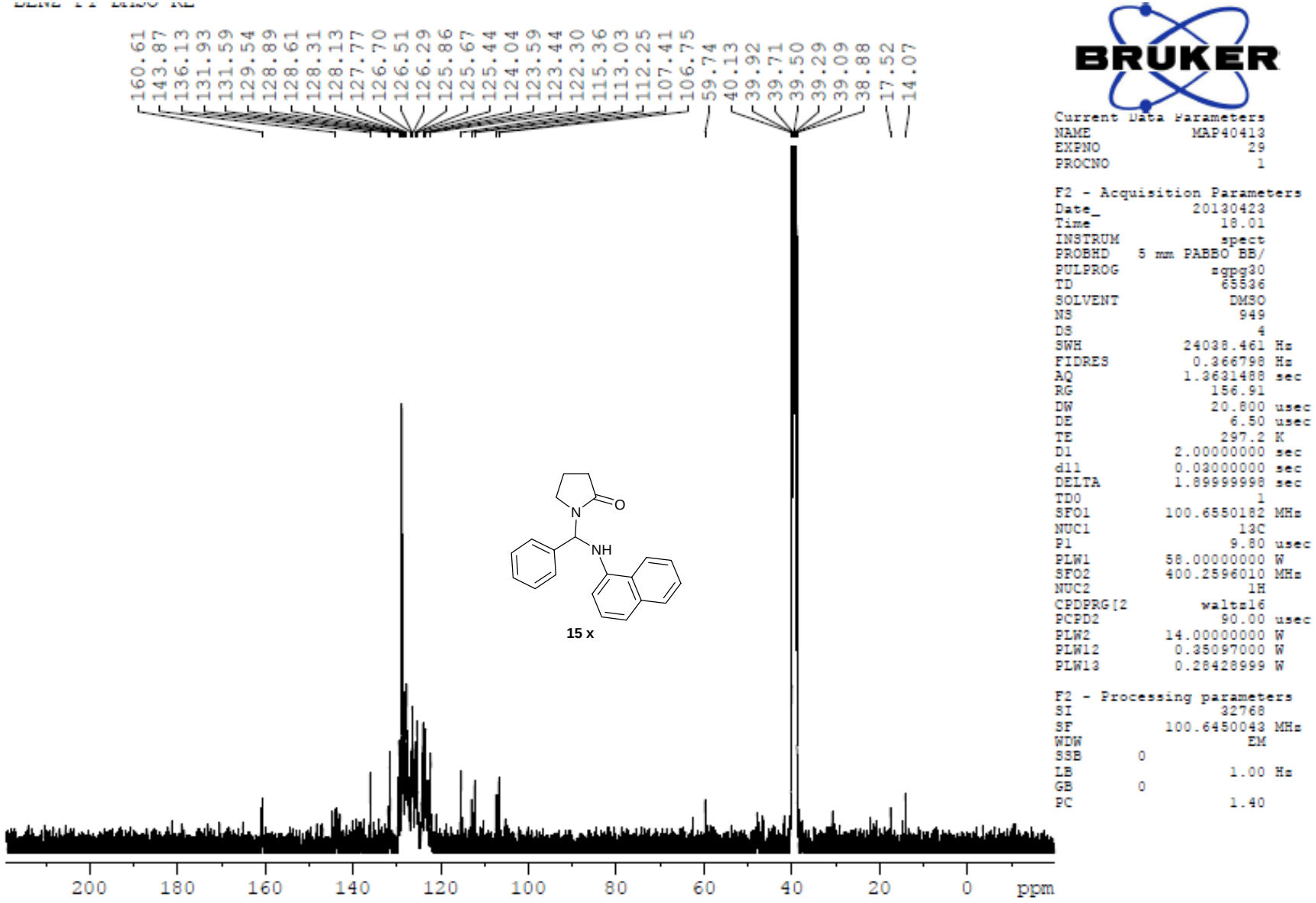
Current Data Parameters
NAME                  MAP40413
EXPNO                       25
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130423
Time                     15.42
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845889 sec
RG                        63.11
DW                       60.800 usec
DE                        6.50 usec
TE                       296.1 K
D1                 1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1              14.00000000 W
SFO1              400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                400.2580056 MHz
WDW                        EM
SSB          0
LB                       0.30 Hz
GB           0
PC                       1.00
```

C^{13} NMR- 1-((naphthalen-1-ylamino)(phenyl)methyl)pyrrolidin-2-one (**15x**)



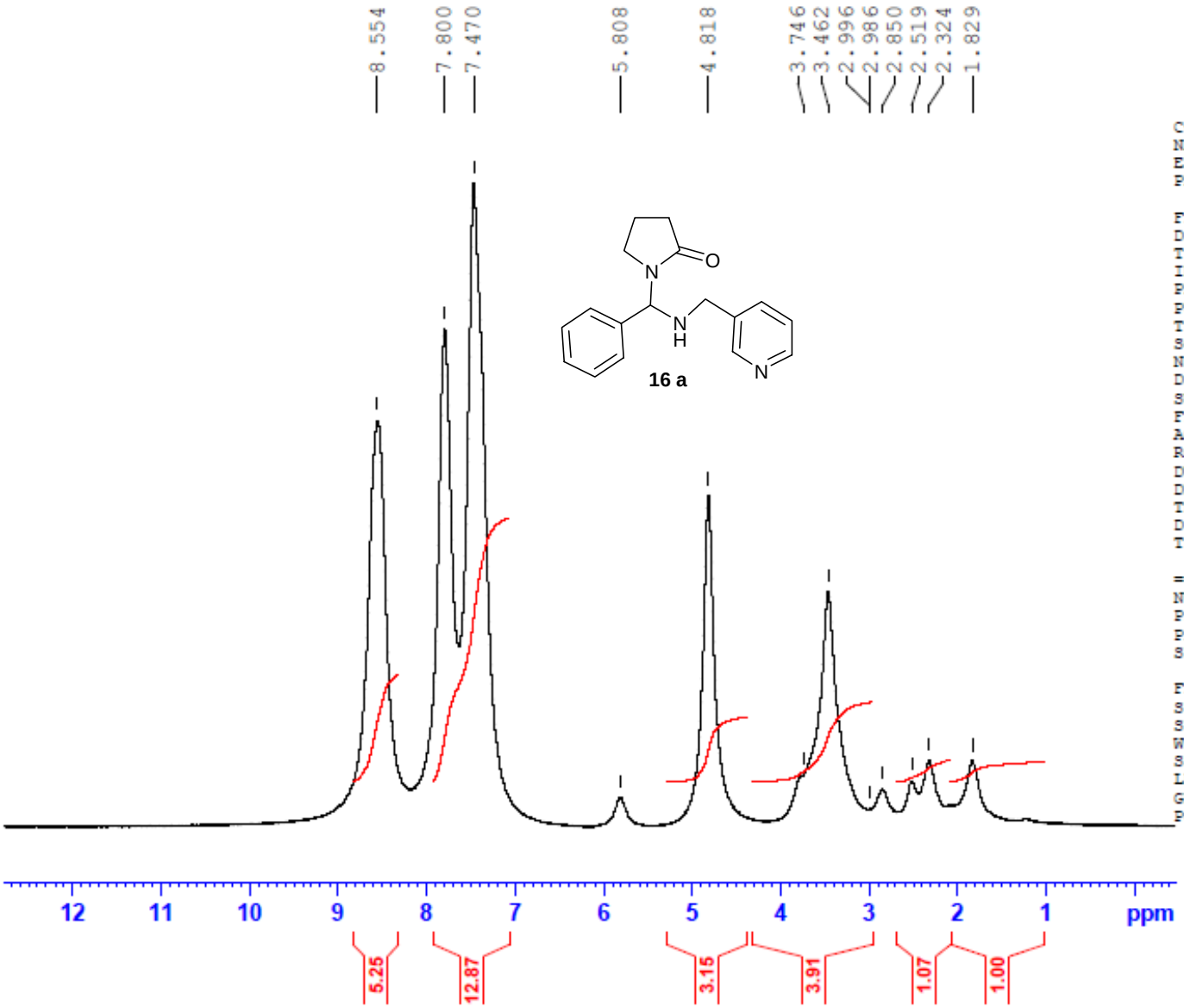
BRUKER

```
Current Data Parameters
NAME              MAP40413
EXPNO                   29
PROCNO                   1

F2 - Acquisition Parameters
Date_           20130423
Time                18.01
INSTRUM             spect
PROBHD   5 mm PABBO BB/
PULPROG          zgpg30
TD                65536
SOLVENT             DMSO
NS                    949
DS                      4
SWH           24038.461 Hz
FIDRES         0.366798 Hz
AQ            1.3631488 sec
RG                156.91
DW                20.800 usec
DE                 6.50 usec
TE                297.2 K
D1            2.00000000 sec
d11           0.03000000 sec
DELTA         1.89999998 sec
TD0                     1
SFO1         100.6550182 MHz
NUC1                 13C
P1                 9.80 usec
PLW1         58.00000000 W
SFO2         400.2596010 MHz
NUC2                 1H
CPDPRG[2          waltz16
PCPD2             90.00 usec
PLW2         14.00000000 W
PLW12         0.35097000 W
PLW13         0.28428999 W

F2 - Processing parameters
SI                  32768
SF           100.6450043 MHz
WDW                    EM
SSB       0
LB                 1.00 Hz
GB        0
PC                 1.40
```

^{1}H NMR- 1-(phenyl(pyridine-3-ylmethylamino)methyl)pyrrolidin-2-one (**16a**)



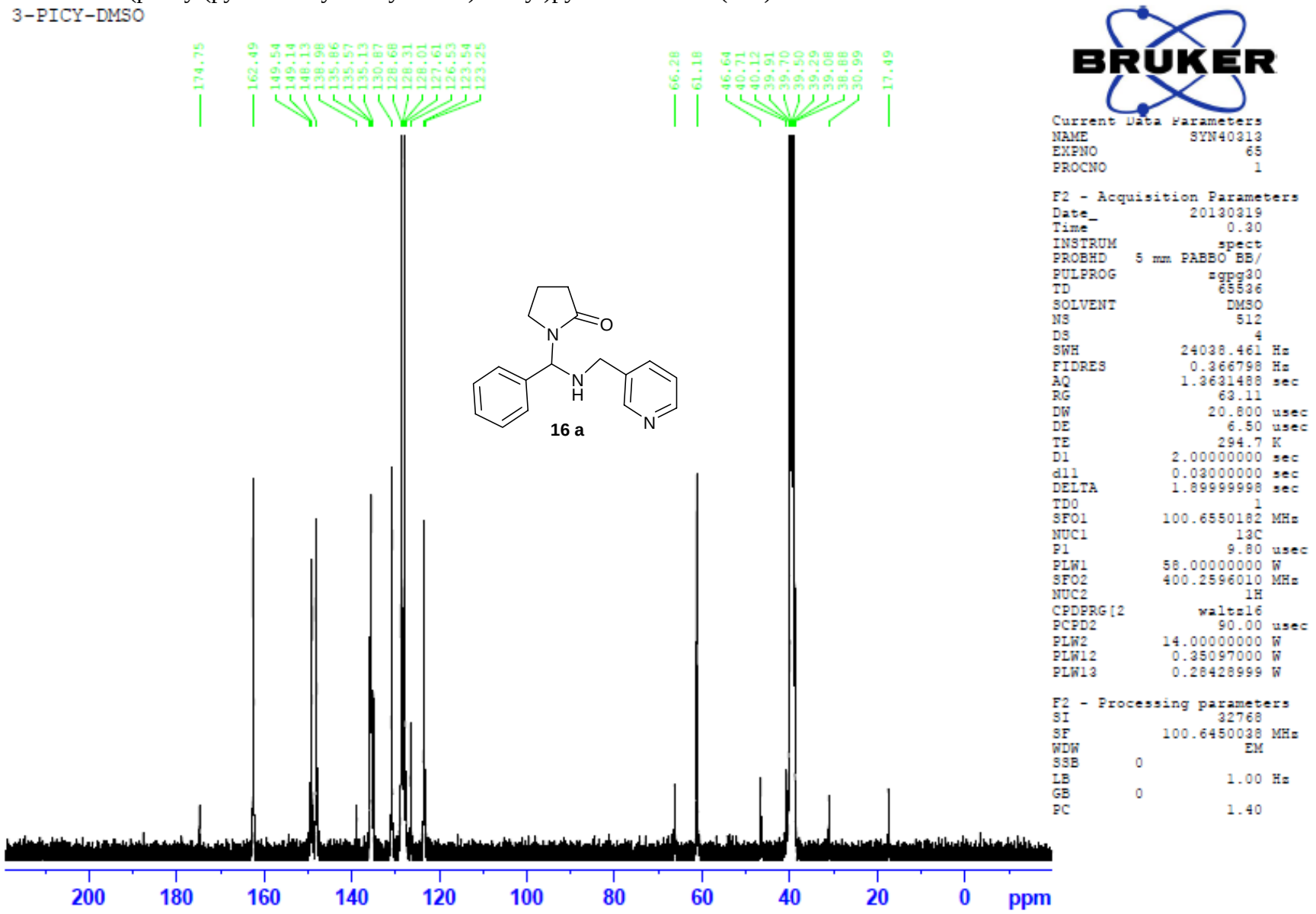

```
Current Data Parameters
NAME                  SYN40313
EXPNO                       64
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130318
Time                      23.58
INSTRUM                   spect
PROBHD    5 mm PABBO BB/
PULPROG                   zg30
TD                       65536
SOLVENT                   DMSO
NS                          16
DS                           2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845889 sec
RG                        35.49
DW                       60.800 usec
DE                        6.50 usec
TE                       293.9 K
D1                    1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1            14.00000000 W
SFO1            400.2604718 MHz

F2 - Processing parameters
SI                       65536
SF                400.2579970 MHz
WDW                         EM
SSB          0
LB                        0.30 Hz
GB           0
PC                        1.00
```

C^{13} NMR- 1-(phenyl(pyridine-3-ylmethylamino)methyl)pyrrolidin-2-one (**16a**)

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Current Data Parameters
NAME                  SYN40313
EXPNO                       65
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130319
Time                    0.30
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                zgpg30
TD                      65536
SOLVENT                   DMSO
NS                          512
DS                            4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                       63.11
DW                      20.800 usec
DE                       6.50 usec
TE                      294.7 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                          1
SFO1                100.6550182 MHz
NUC1                       13C
P1                       9.80 usec
PLW1                58.00000000 W
SFO2                400.2596010 MHz
NUC2                       1H
CPDPRG[2                waltz16
PCPD2                   90.00 usec
PLW2                14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                          32768
SF                 100.6450038 MHz
WDW                            EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```
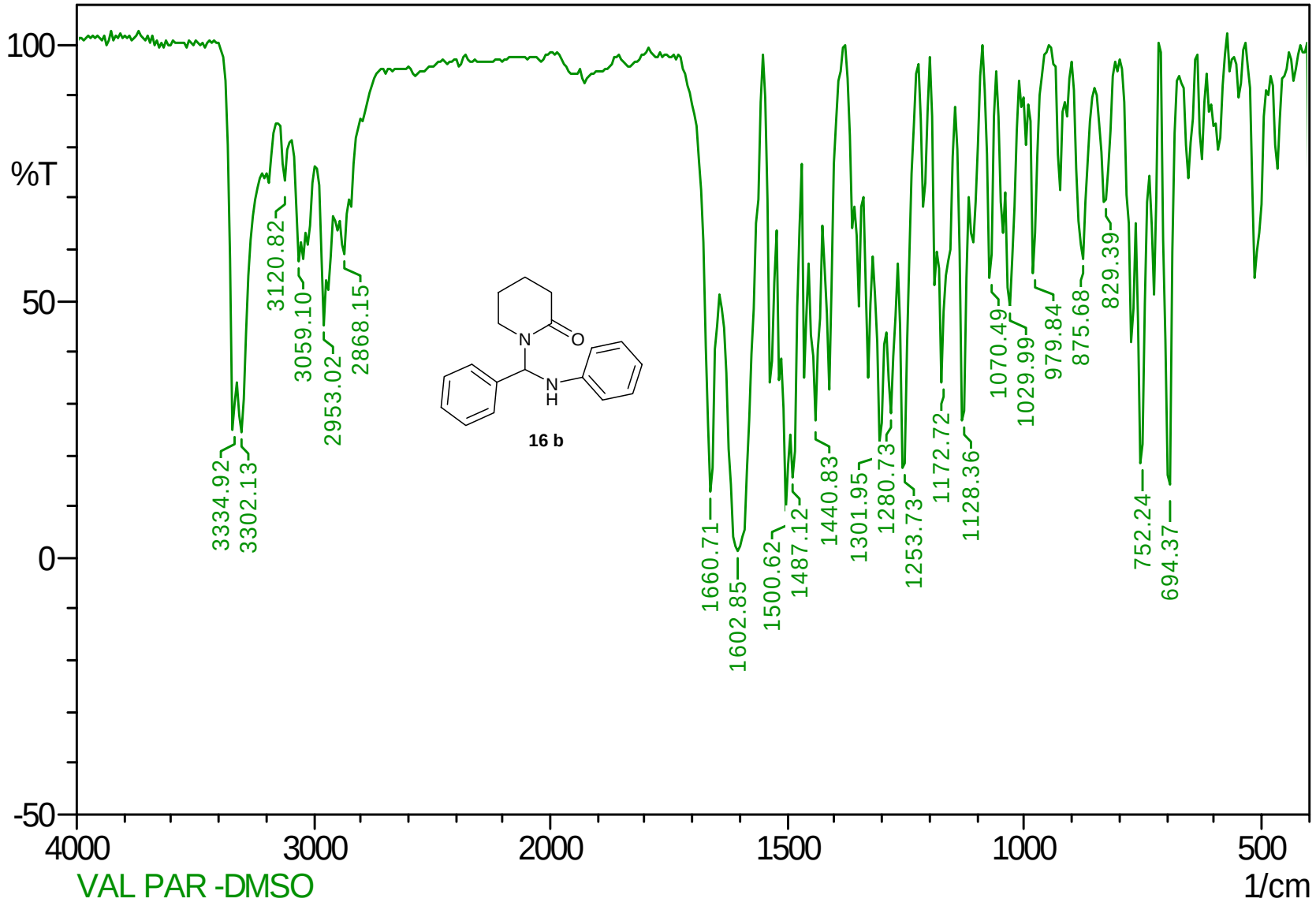
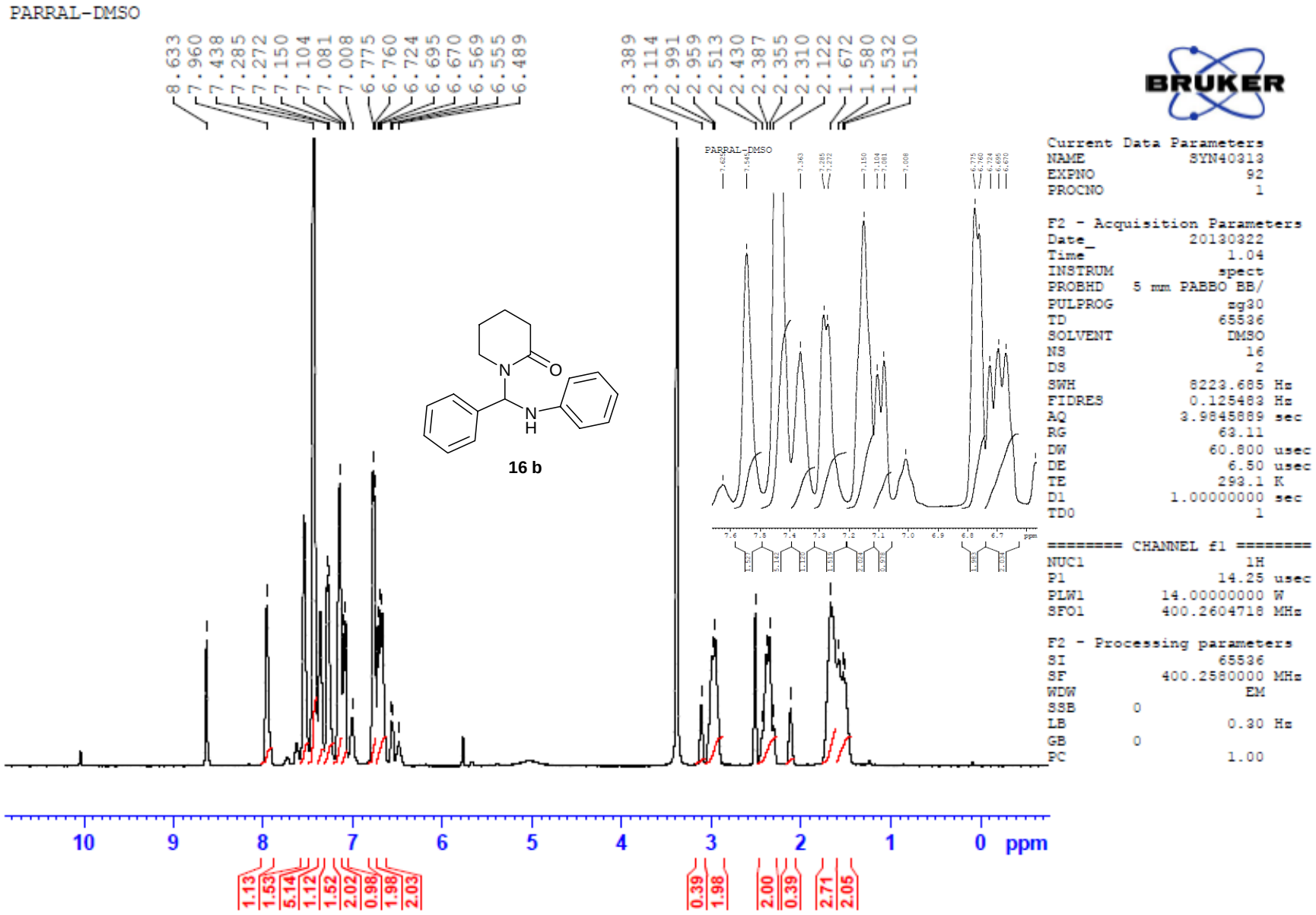
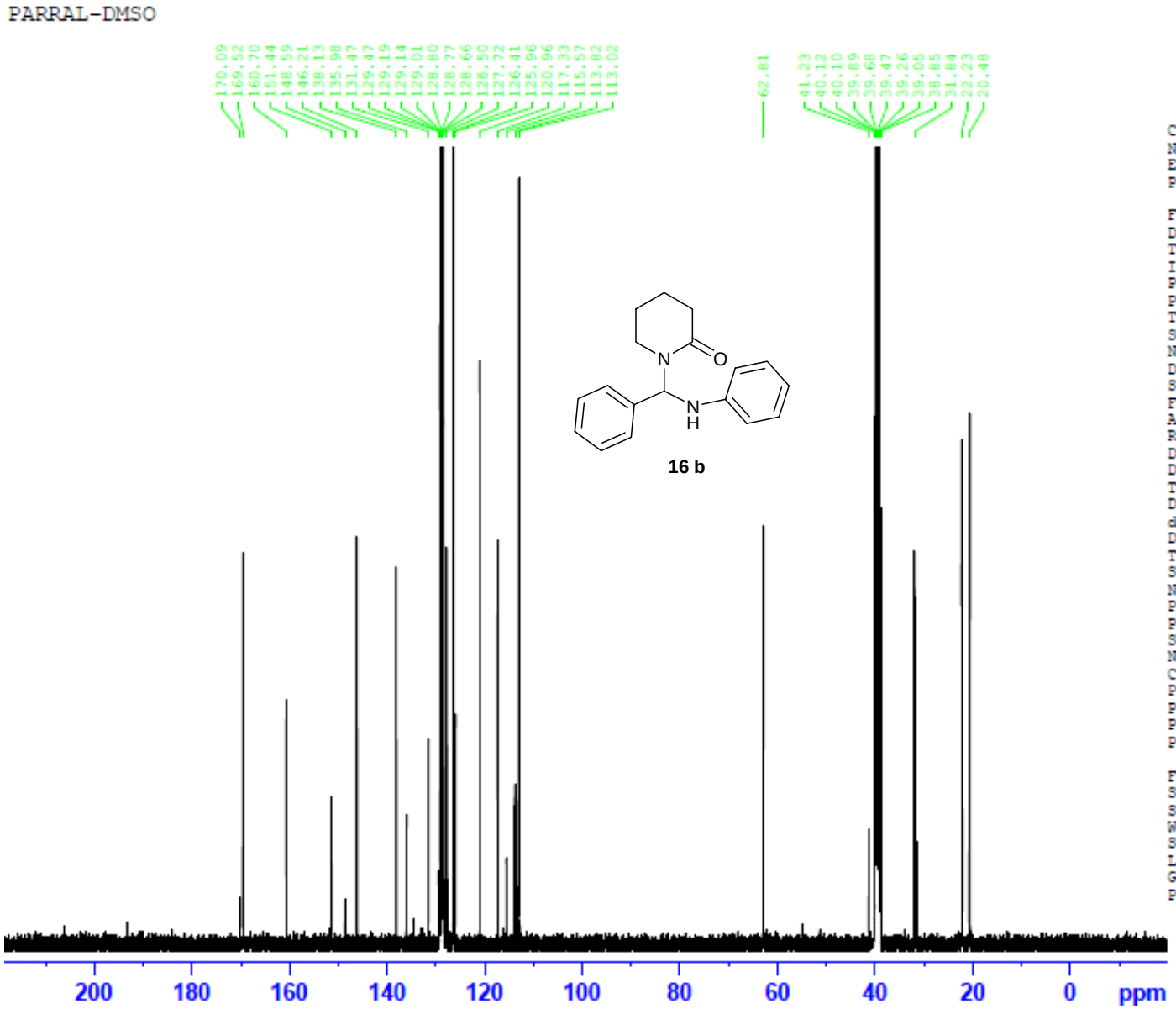

IR Spectrum of 1-(phenyl(phenylamino)methyl)piperidin-2-one (**16b**)



1H NMR- 1-(phenyl(phenylamino)methyl)piperidin-2-one (**16b**)



C^{13} NMR- 1-(phenyl(phenylamino)methyl)piperidin-2-one (**16b**)



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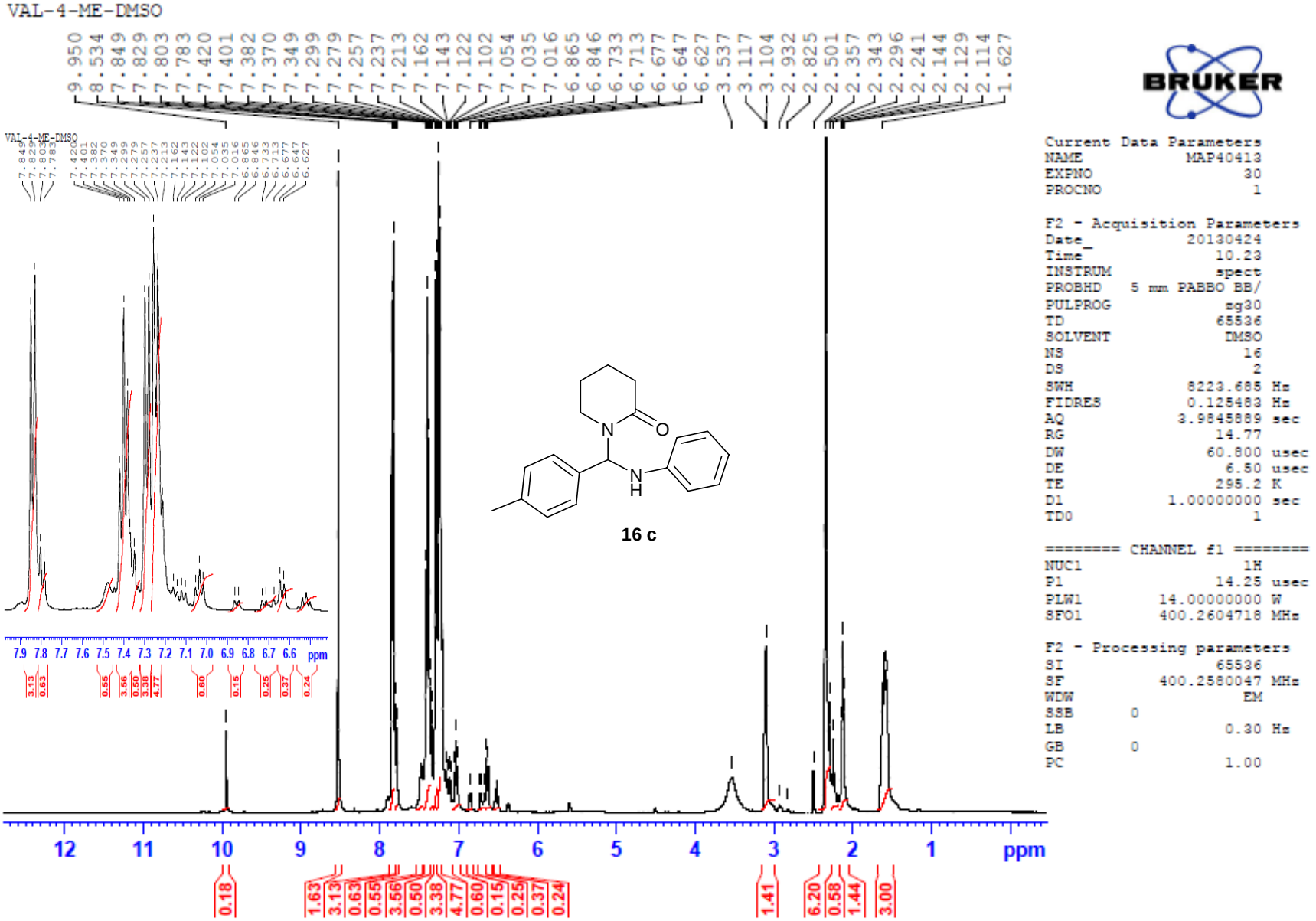
Current Data Parameters
NAME                 SYN40313
EXPNO                      93
PROCNO                      1

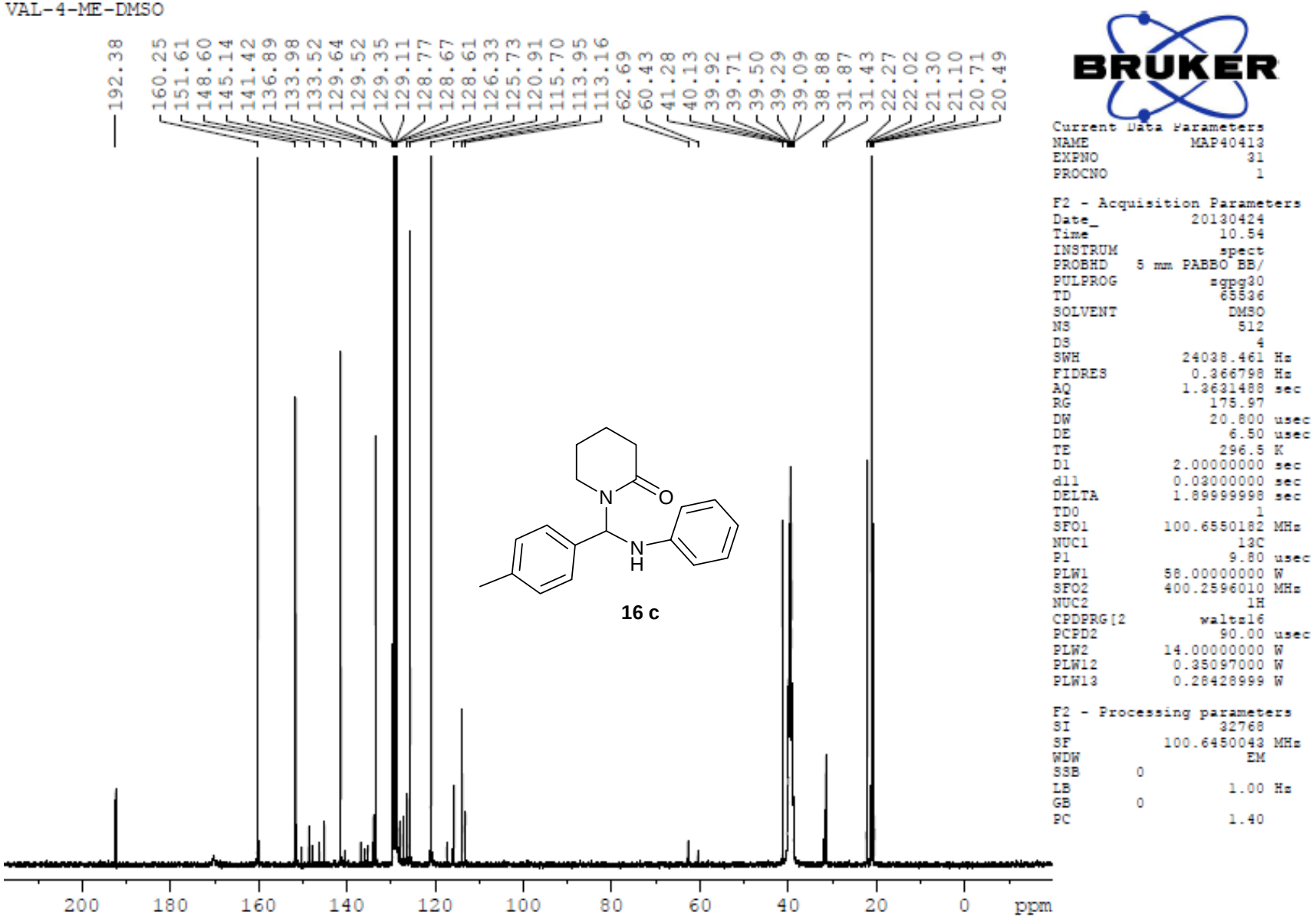
F2 - Acquisition Parameters
Date_               20130322
Time                    1.34
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG             zgpg30
TD                       65536
SOLVENT                  DMSO
NS                        512
DS                          4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                      127.79
DW                      20.800 usec
DE                       6.50 usec
TE                      293.9 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                         1
SFO1               100.6550182 MHz
NUC1                      13C
P1                       9.80 usec
PLW1                58.00000000 W
SFO2               400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2                14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6450043 MHz
WDW                         EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

^{1}H NMR- 1-((phenylamino)(p-tolyl)methyl)piperidin-2-one (**16c**)



C^{13} NMR- 1-((phenylamino)(p-tolyl)methyl)piperidin-2-one (**16c**)



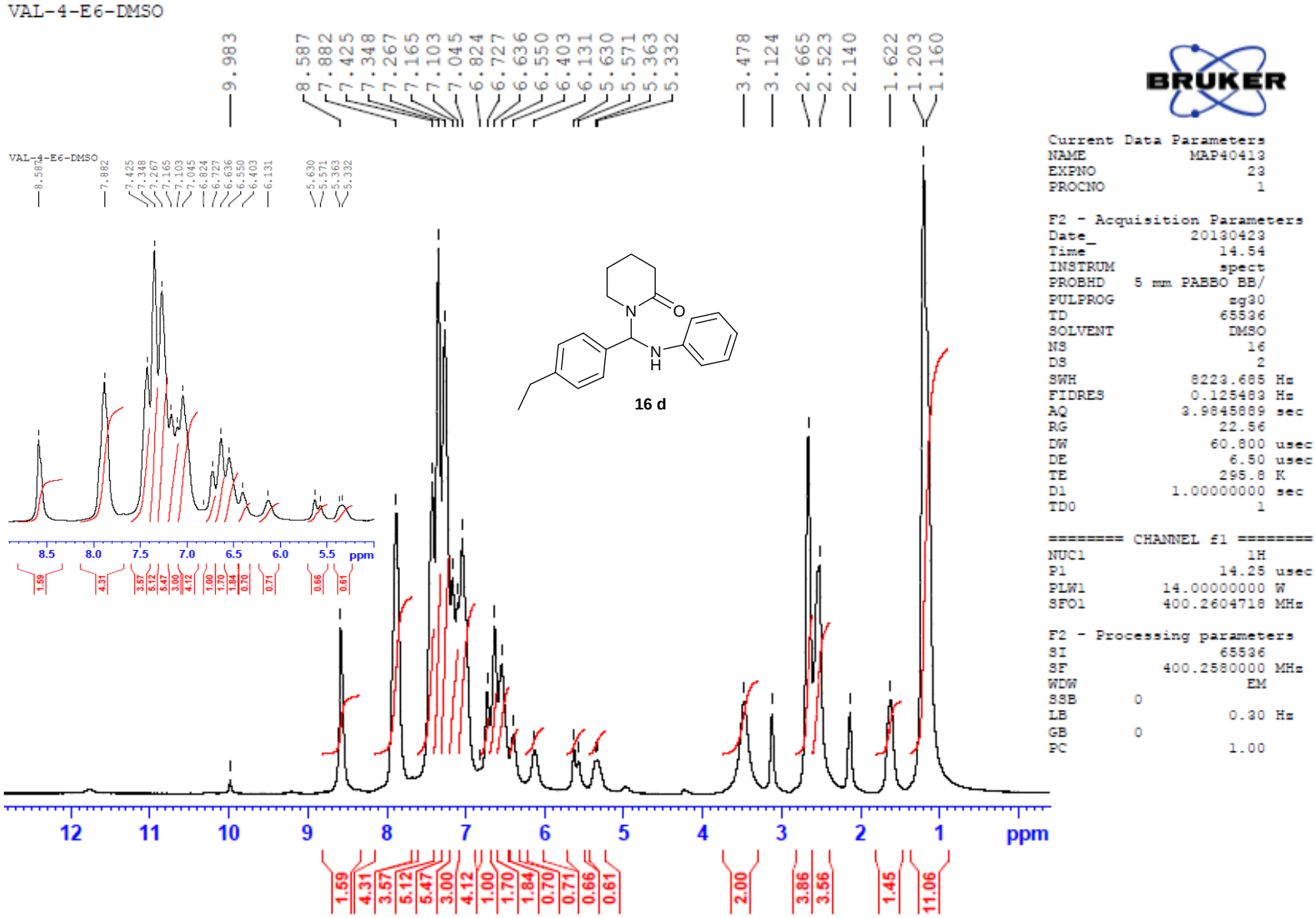
16 c


```
Current Data Parameters
NAME                  MAP40413
EXPNO                       31
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130424
Time                   10.54
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG              zgpg30
TD                    65536
SOLVENT                DMSO
NS                       512
DS                         4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     175.97
DW                     20.800 usec
DE                      6.50 usec
TE                     296.5 K
D1                  2.00000000 sec
d11                 0.03000000 sec
DELTA               1.89999998 sec
TD0                          1
SFO1              100.6550182 MHz
NUC1                      13C
P1                       9.80 usec
PLW1              58.00000000 W
SFO2              400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2              14.00000000 W
PLW12              0.35097000 W
PLW13              0.28428999 W

F2 - Processing parameters
SI                       32768
SF                100.6450043 MHz
WDW                         EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

^{1}H NMR- 1-((4-Ethylphenyl)(phenylamino)methyl)piperidin-2-one (**16d**)



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Current Data Parameters
NAME                  MAP40413
EXPNO                       23
PROCNO                       1

F2 - Acquisition Parameters
Date_                20130423
Time                    14.54
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                         16
DS                          2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      22.56
DW                     60.800 usec
DE                      6.50 usec
TE                     295.8 K
D1                  1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.25 usec
PLW1           14.00000000 W
SFO1           400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF             400.2580000 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```
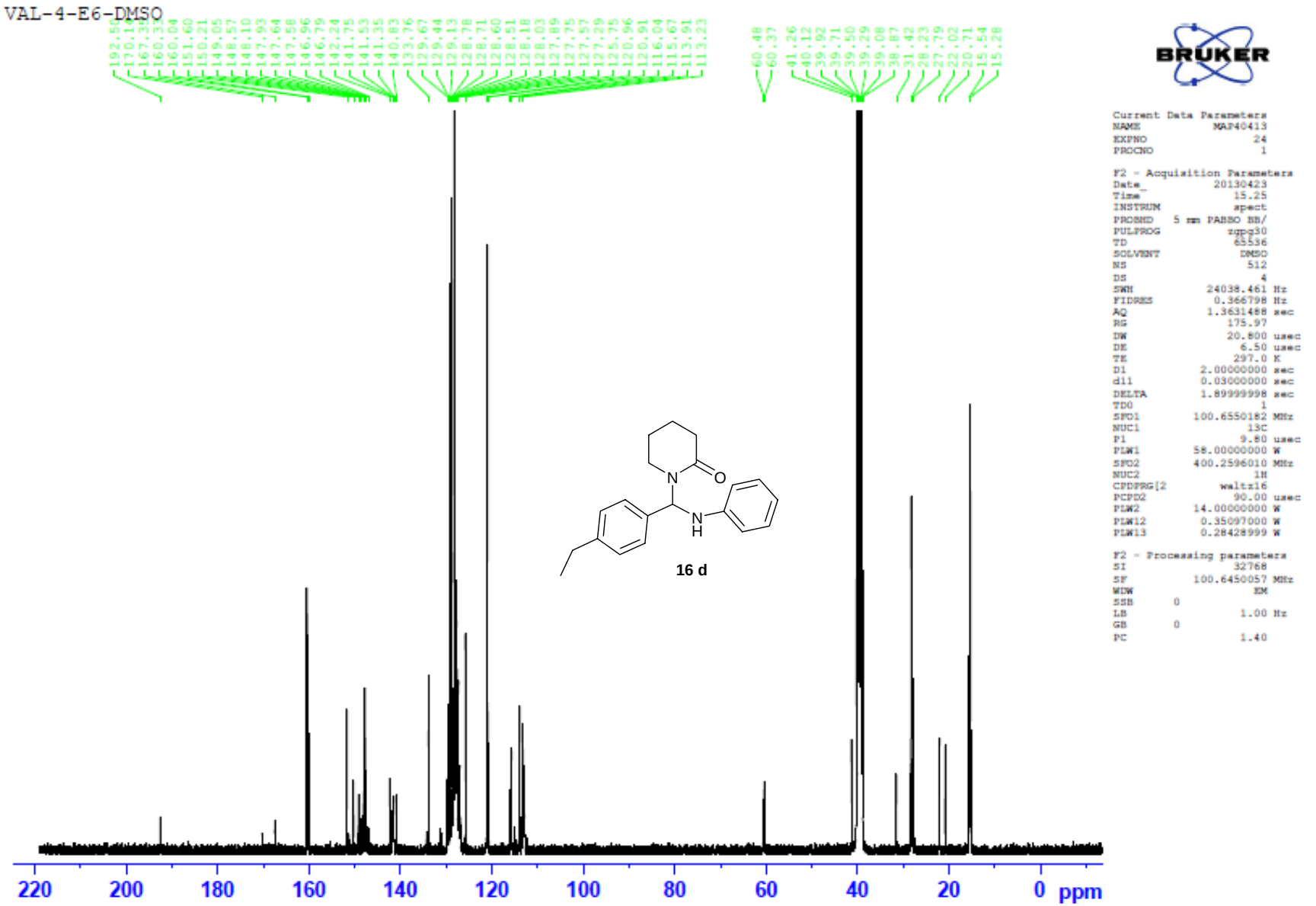
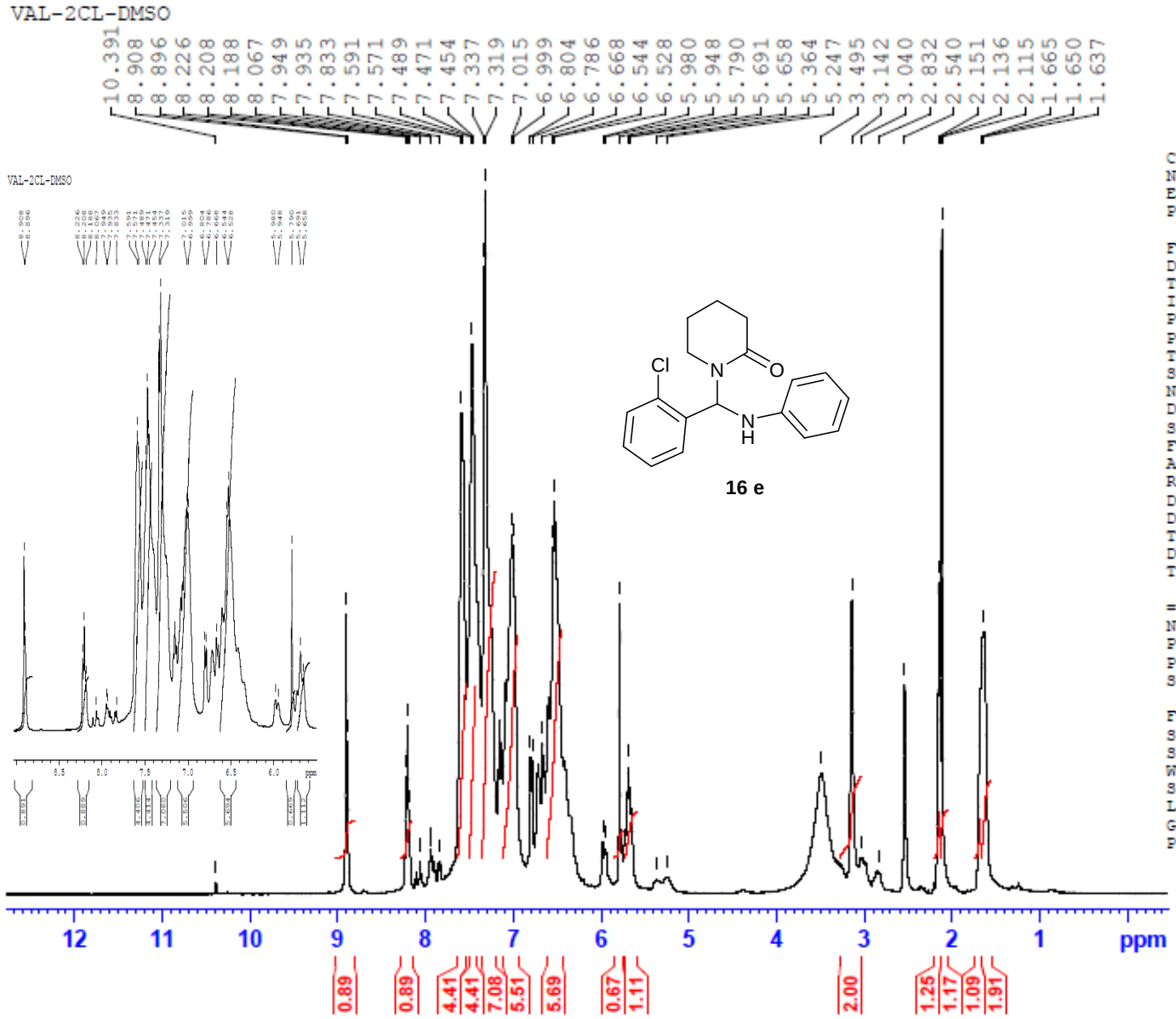

C^{13} NMR- 1-((4-bromophenyl)(phenylamino)methyl)piperidin-2-one (**16d**)

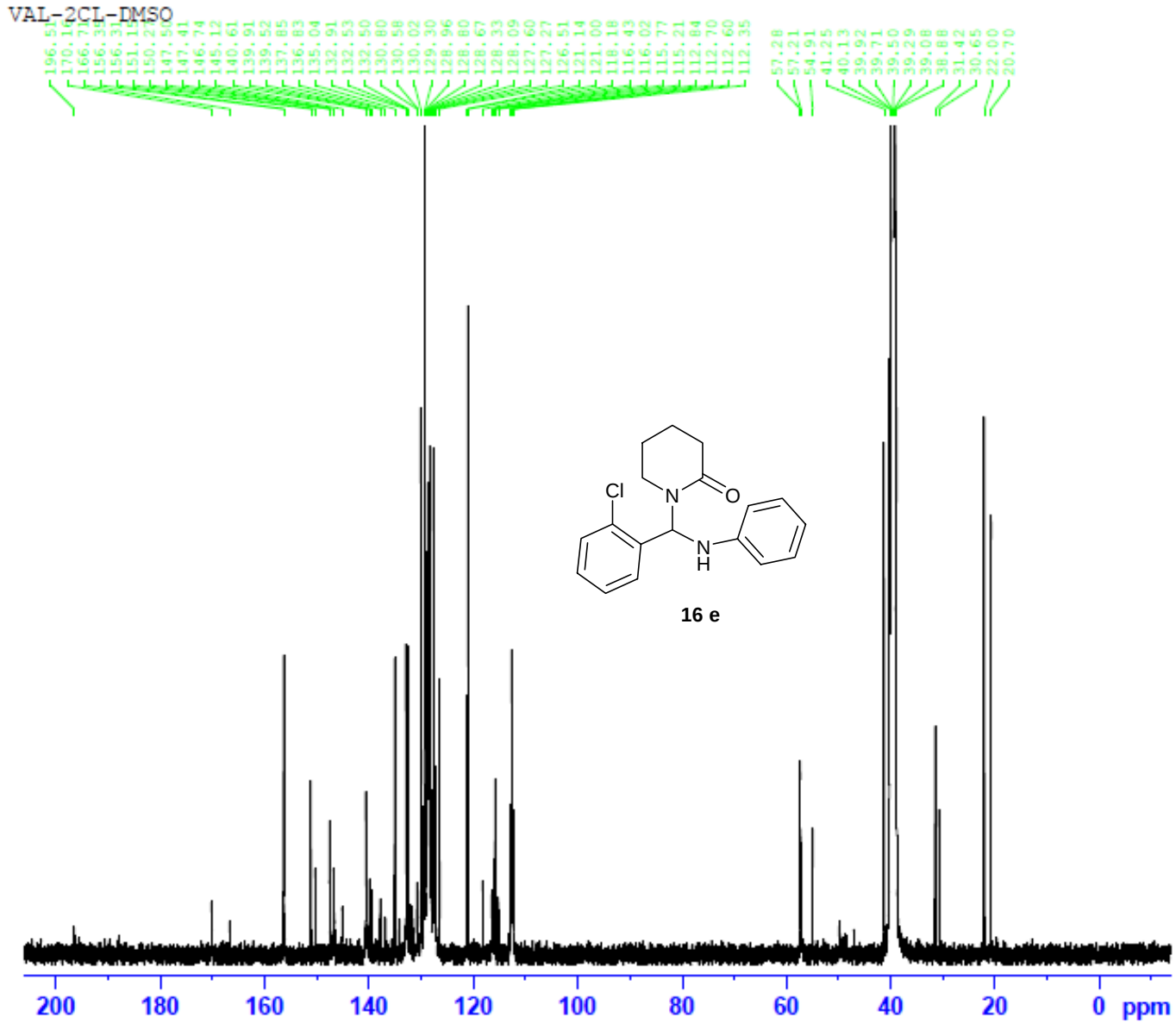


1H NMR- 1-((2-chlorophenyl)(phenylamino)methyl)piperidin-2-one (**16e**)



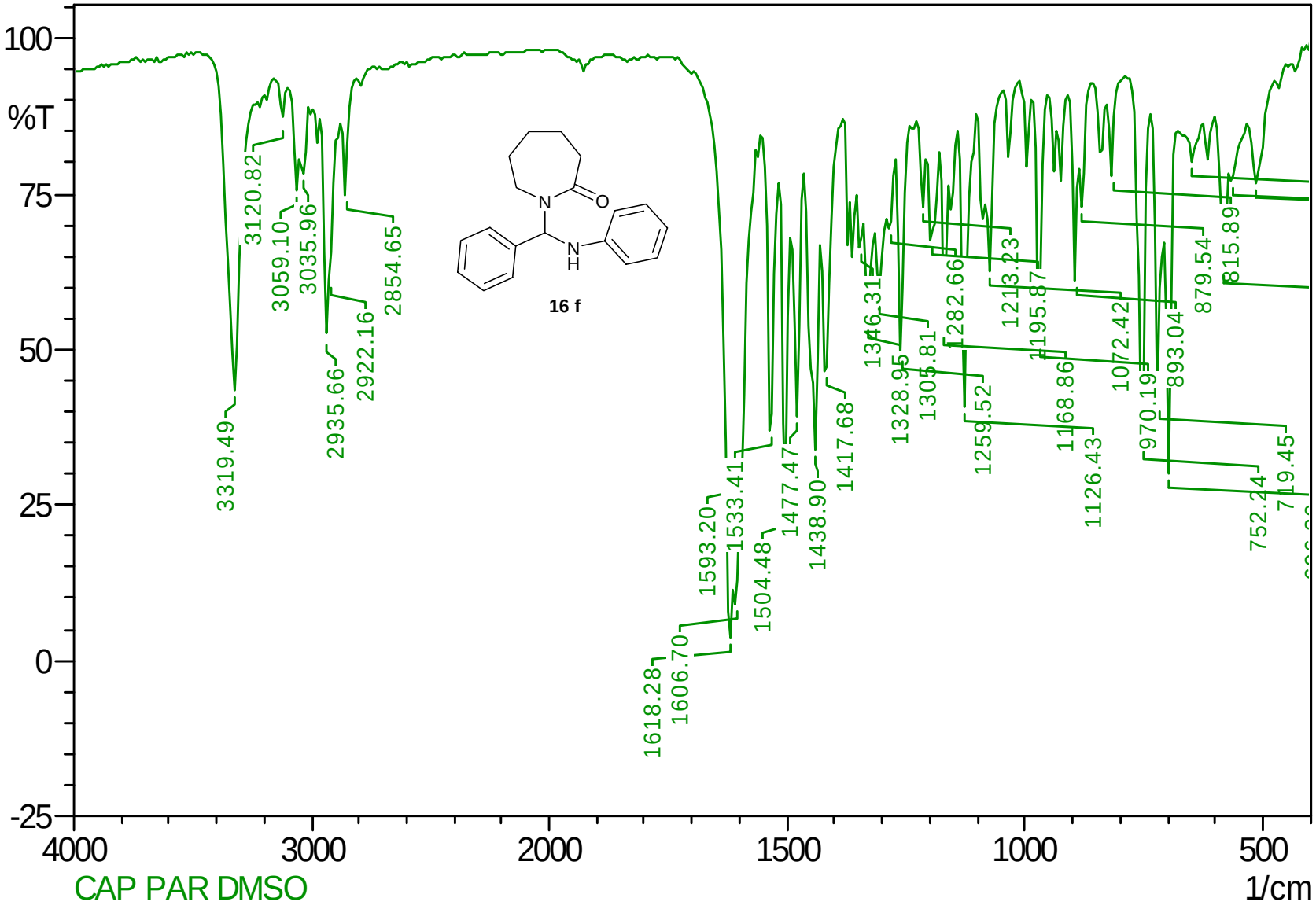

```
Current Data Parameters
NAME                  SYN40413
EXPNO                       64
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130422
Time                    17.12
INSTRUM                 spect
PROBHD     5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                        16
DS                         2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      35.49
DW                     60.800 usec
DE                      6.50 usec
TE                     293.0 K
D1                1.00000000 sec
TD0                        1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.25 usec
PLW1             14.00000000 W
SFO1             400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF               400.2579879 MHz
WDW                       EM
SSB          0
LB                      0.30 Hz
GB           0
PC                      1.00
```

C^{13} NMR- 1-((2-chlorophenyl)(phenylamino)methyl)piperidin-2-one (**16e**)

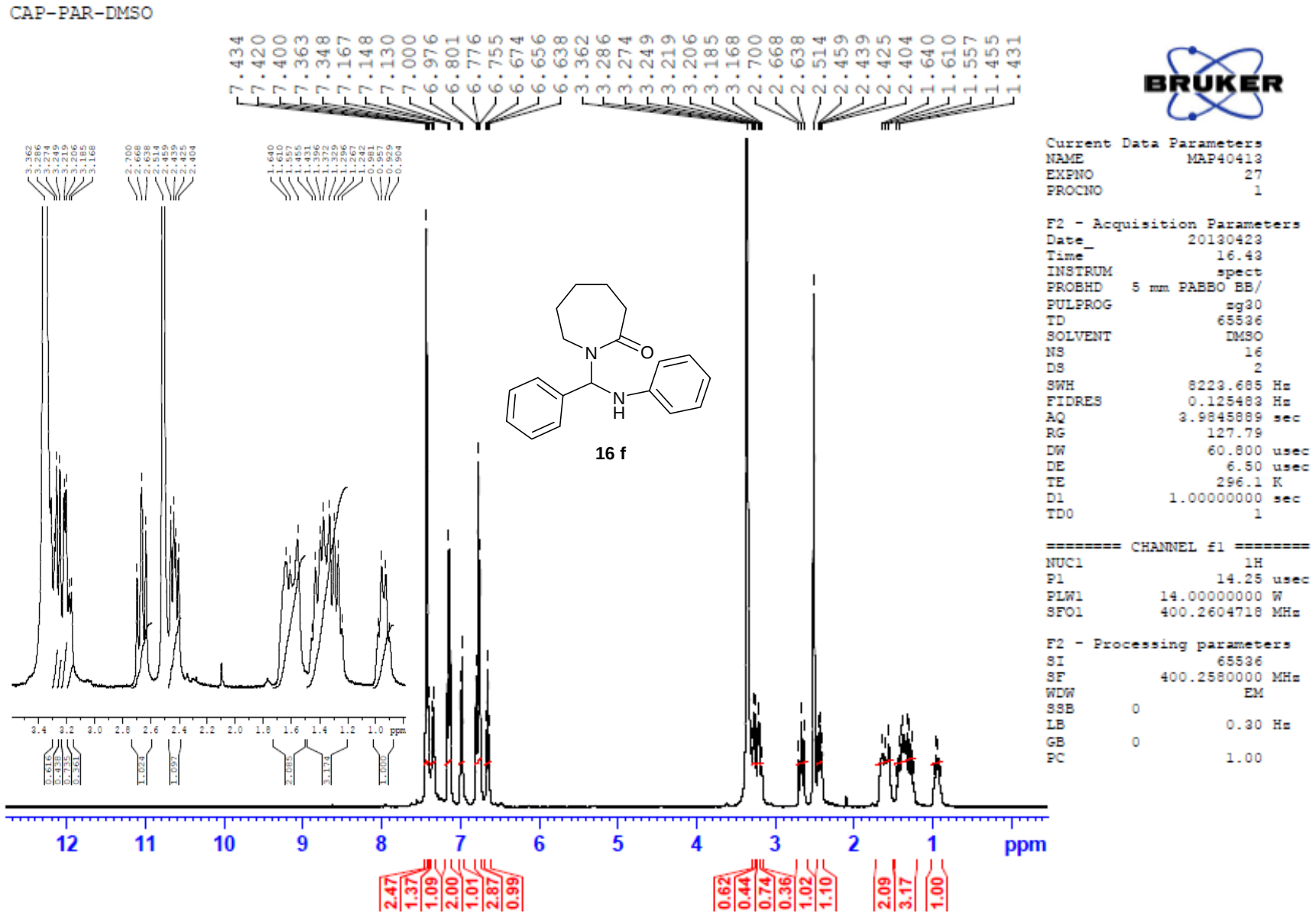



```
Current Data Parameters
NAME                 SYN40413
EXPNO                      65
PROCNO                      1

F2 - Acquisition Parameters
Date_               20130422
Time                   18.52
INSTRUM                spect
PROBHD    5 mm PABBO BB/
PULPROG                sgpg30
TD                      65536
SOLVENT                  DMSO
NS                       1024
DS                          4
SWH                24038.461 Hz
FIDRES              0.366798 Hz
AQ                  1.3631488 sec
RG                     143.73
DW                     20.800 usec
DE                      6.50 usec
TE                     293.6 K
D1                 2.00000000 sec
d11                0.03000000 sec
DELTA              1.89999998 sec
TD0                         1
SFO1             100.6550182 MHz
NUC1                      13C
P1                       9.80 usec
PLW1               58.00000000 W
SFO2             400.2596010 MHz
NUC2                      1H
CPDPRG[2               waltz16
PCPD2                   90.00 usec
PLW2               14.00000000 W
PLW12               0.35097000 W
PLW13               0.28428999 W

F2 - Processing parameters
SI                      32768
SF               100.6450066 MHz
WDW                        EM
SSB          0
LB                      1.00 Hz
GB           0
PC                      1.40
```

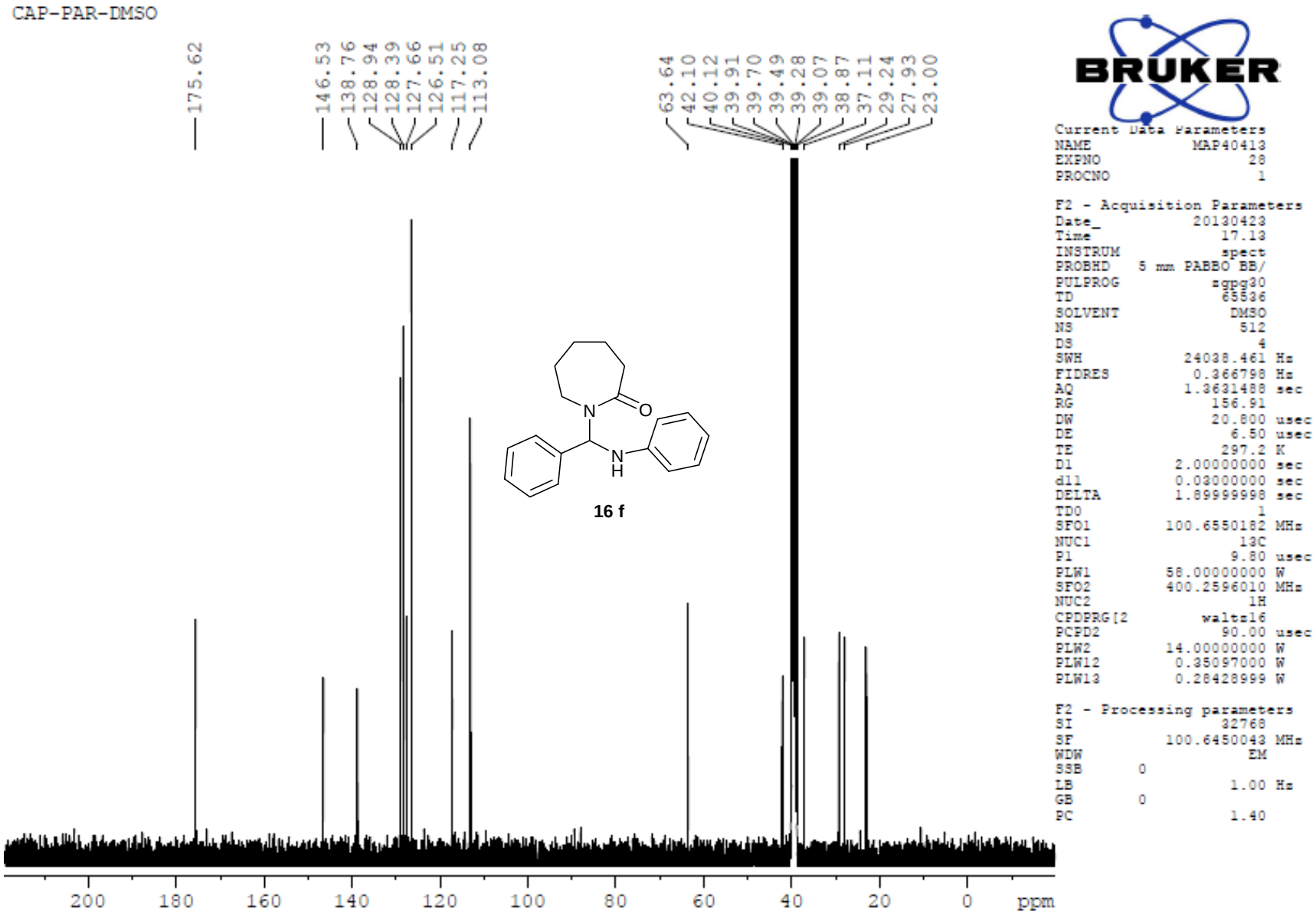
IR Spectrum of 1-(phenyl(phenylamino)methyl)azepan-2-one (**16f**)



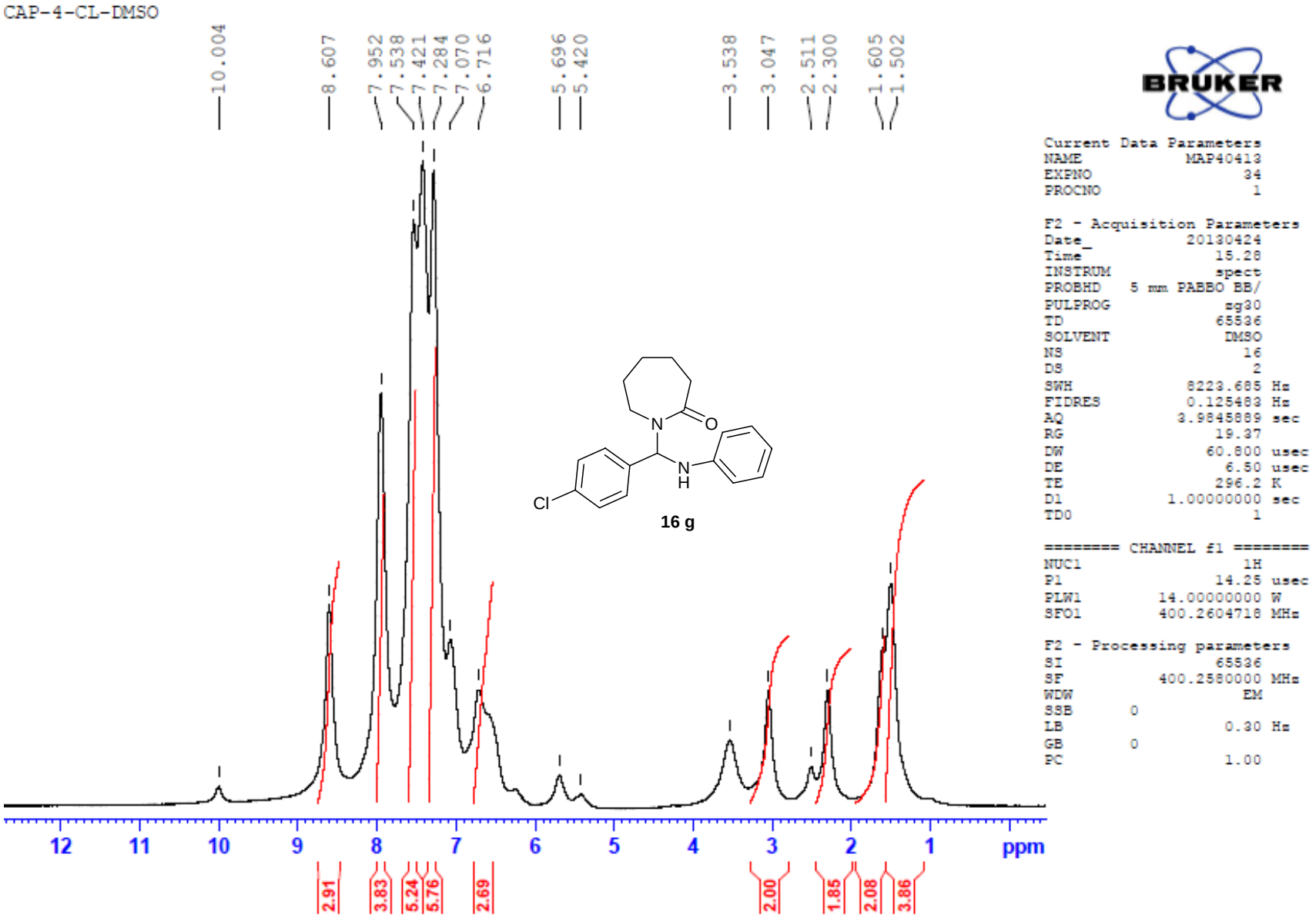
^{1}H NMR- 1-(phenyl(phenylamino)methyl)azepan-2-one (**16f**)



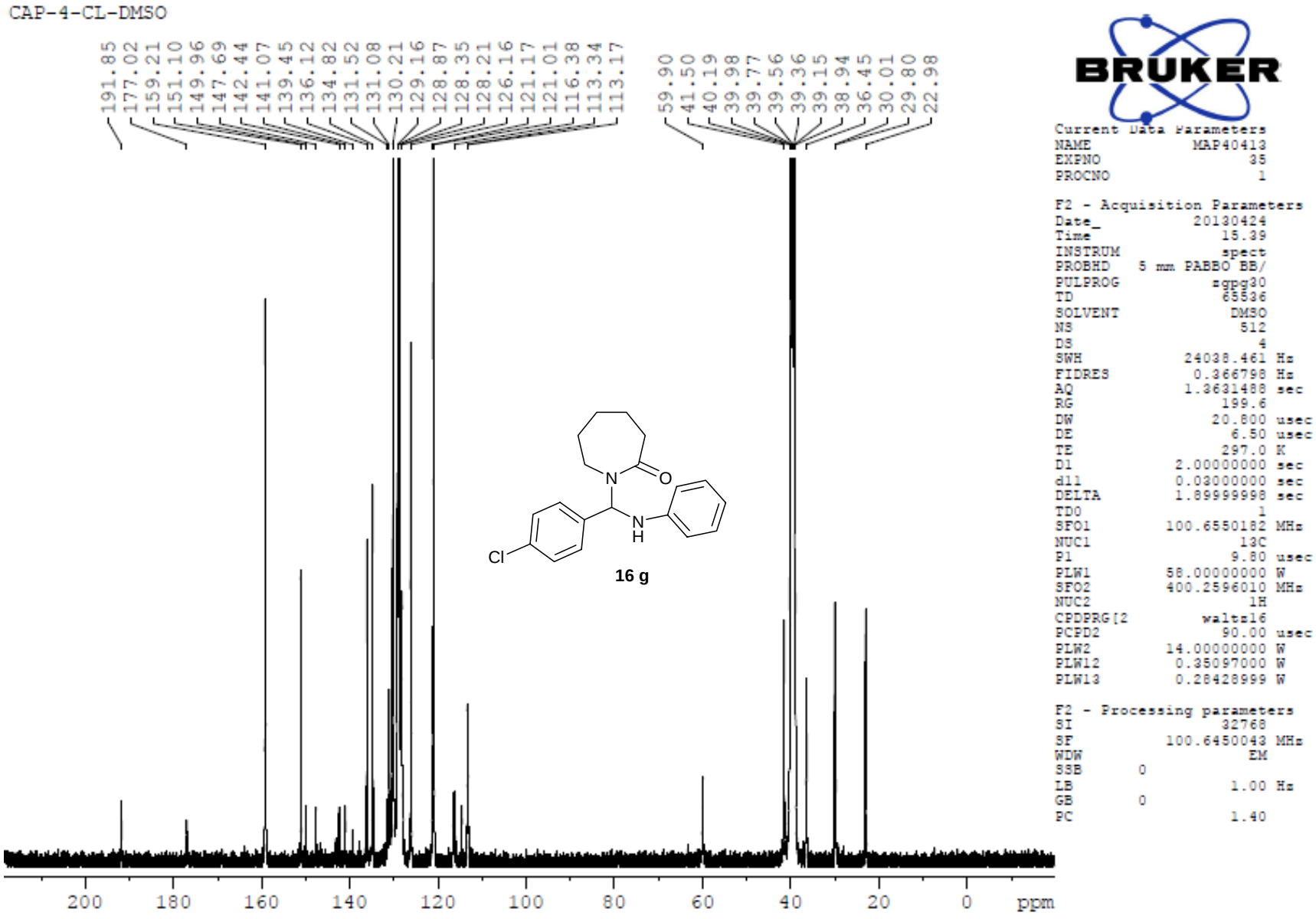
C^{13} NMR- 1-(phenyl(phenylamino)methyl)azepan-2-one (**16f**)



^{1}H NMR- 1-((4-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16g**)

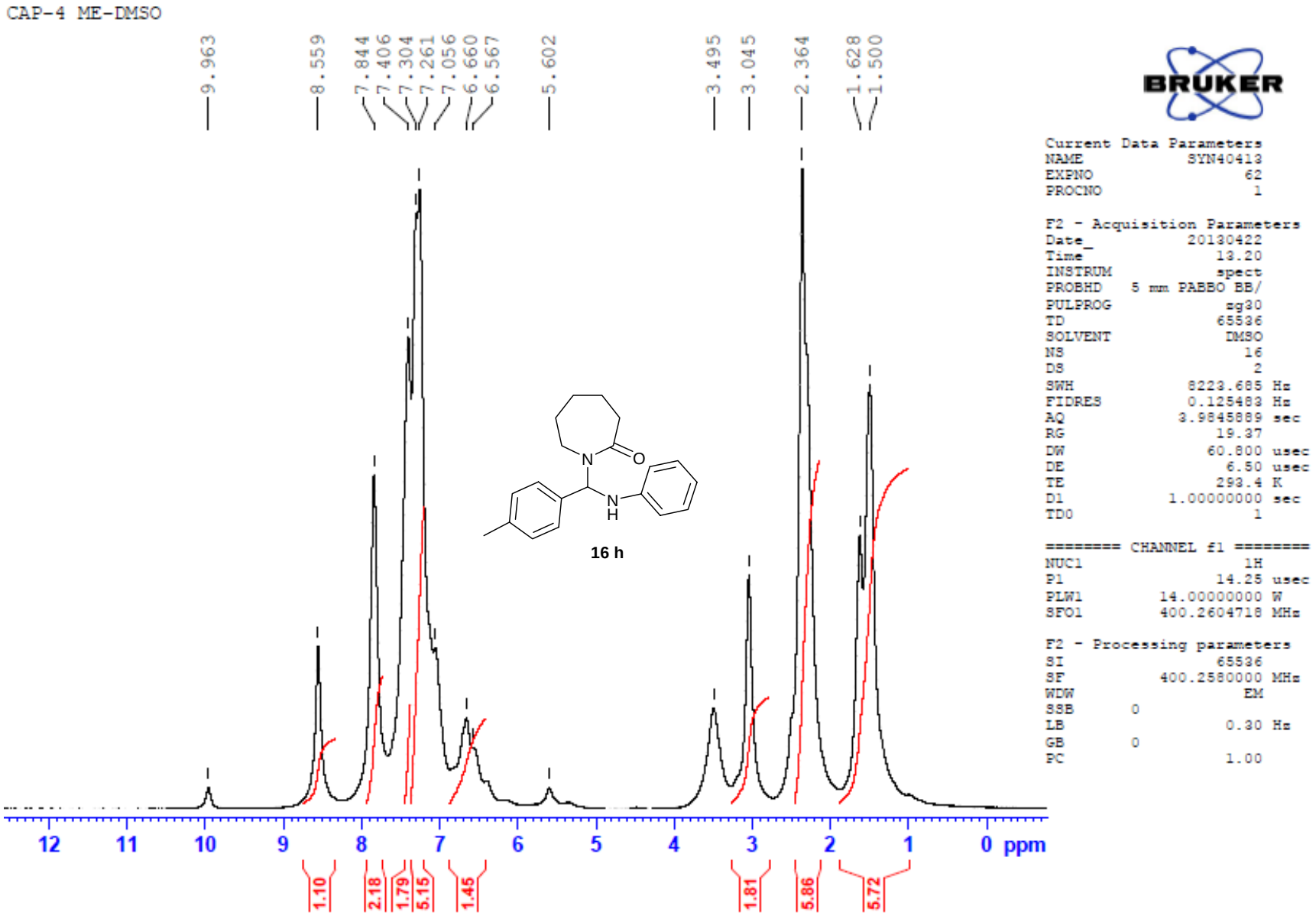


C^{13} NMR- 1-((4-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16g**)



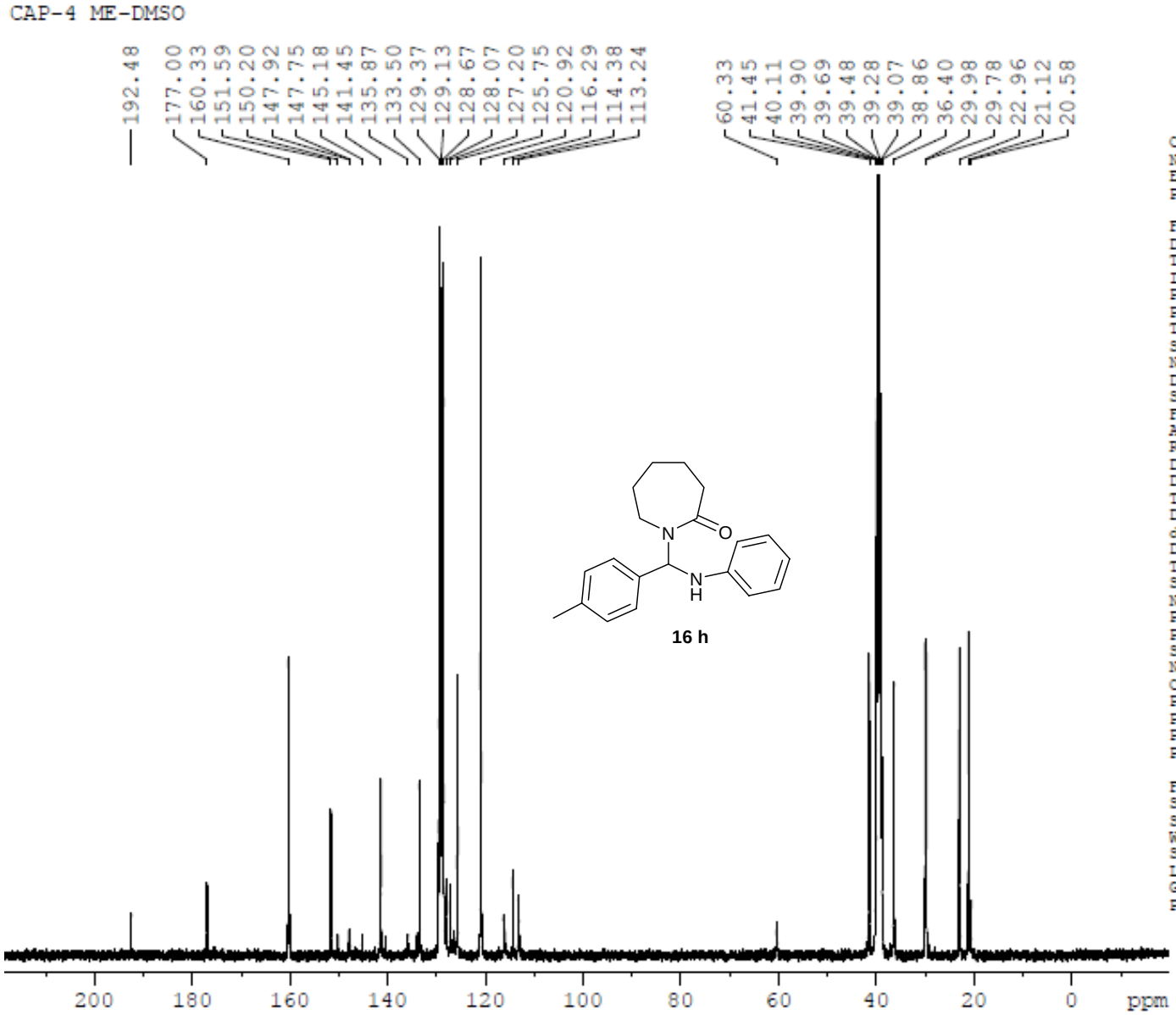

```
Current Data Parameters
NAME              MAP40413
EXPNO                   35
PROCNO                   1

F2 - Acquisition Parameters
Date_            20130424
Time                15.39
INSTRUM             spect
PROBHD    5 mm PABBO BB/
PULPROG           zgpg30
TD                 65536
SOLVENT              DMSO
NS                     512
DS                       4
SWH            24038.461 Hz
FIDRES          0.366798 Hz
AQ              1.3631488 sec
RG                  199.6
DW                 20.800 usec
DE                  6.50 usec
TE                297.0 K
D1             2.00000000 sec
d11            0.03000000 sec
DELTA          1.89999998 sec
TD0                      1
SFO1         100.6550182 MHz
NUC1                   13C
P1                  9.80 usec
PLW1          58.00000000 W
SFO2         400.2596010 MHz
NUC2                   1H
CPDPRG[2            waltz16
PCPD2              90.00 usec
PLW2          14.00000000 W
PLW12          0.35097000 W
PLW13          0.28428999 W

F2 - Processing parameters
SI                   32768
SF           100.6450043 MHz
WDW                     EM
SSB       0
LB                  1.00 Hz
GB        0
PC                  1.40
```

^{1}H NMR- 1-((phenylamino)(p-tolyl)methyl)azepan-2-one (**16h**)




```
Current Data Parameters
NAME                  SYN40413
EXPNO                       62
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130422
Time                     13.20
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                  zg30
TD                      65536
SOLVENT                  DMSO
NS                         16
DS                          2
SWH                   8223.685 Hz
FIDRES                0.125483 Hz
AQ                    3.9845889 sec
RG                       19.37
DW                      60.800 usec
DE                       6.50 usec
TE                      293.4 K
D1                    1.00000000 sec
TD0                          1

======== CHANNEL f1 ========
NUC1                        1H
P1                       14.25 usec
PLW1                14.00000000 W
SFO1                400.2604718 MHz

F2 - Processing parameters
SI                      65536
SF                  400.2580000 MHz
WDW                        EM
SSB                 0
LB                       0.30 Hz
GB                  0
PC                       1.00
```

C^{13} NMR- 1-((phenylamino)(p-tolyl)methyl)azepan-2-one (**16h**)



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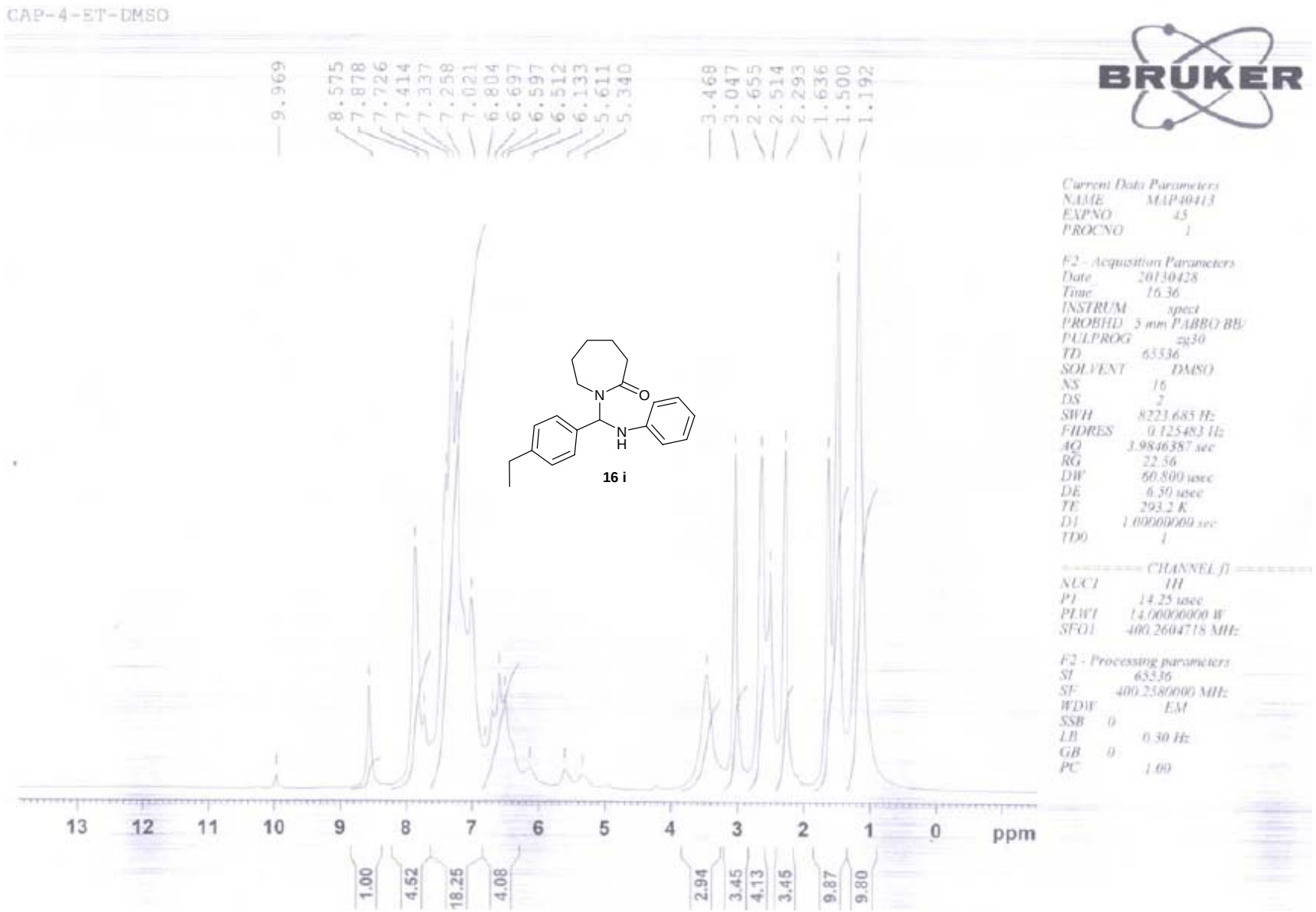
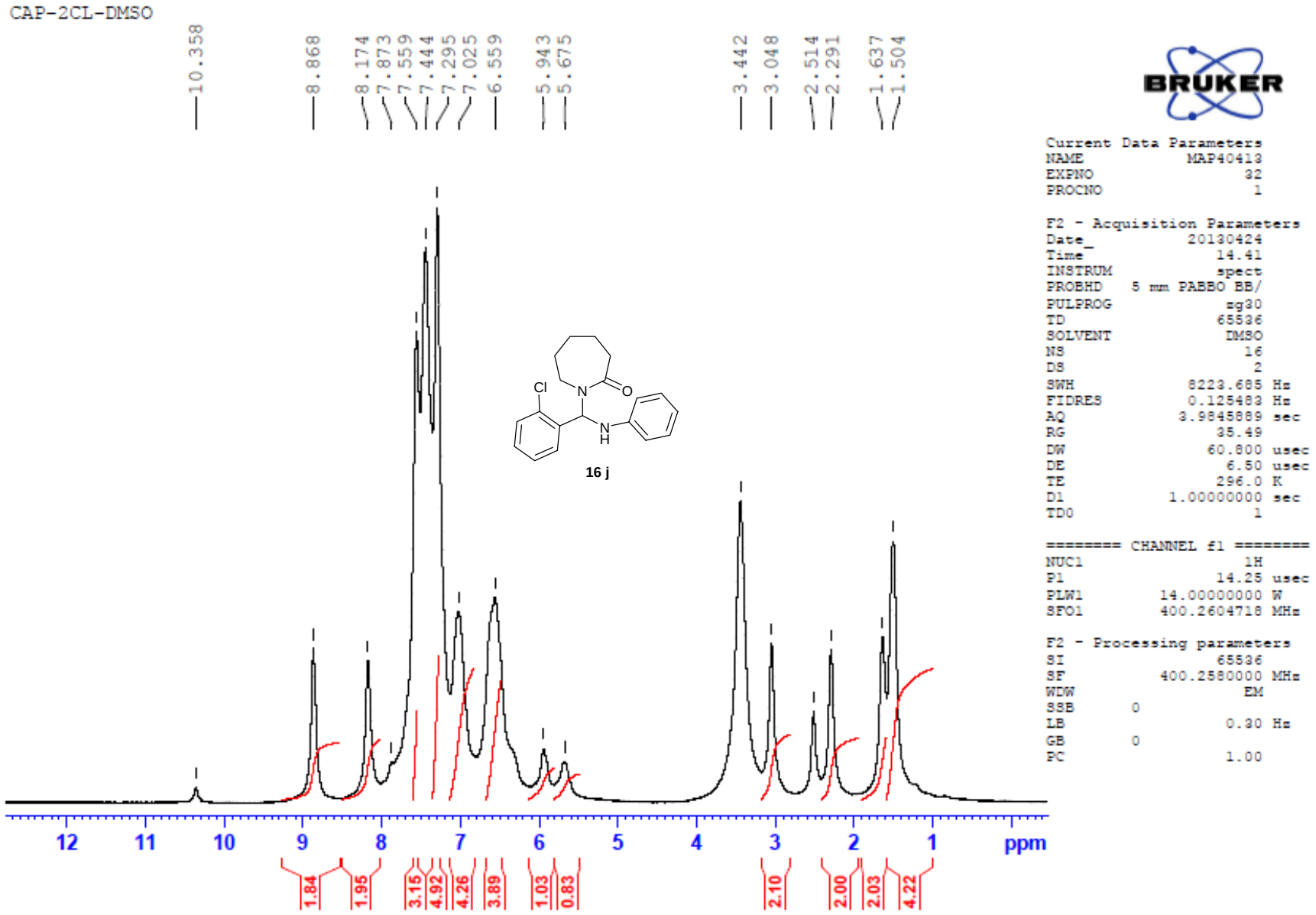
```
Current Data Parameters
NAME                  SYN40413
EXPNO                       63
PROCNO                       1

F2 - Acquisition Parameters
Date_                 20130422
Time                     14.21
INSTRUM                  spect
PROBHD    5 mm PABBO BB/
PULPROG                zgpg30
TD                      65536
SOLVENT                   DMSO
NS                        1024
DS                           4
SWH                 24038.461 Hz
FIDRES               0.366798 Hz
AQ                   1.3631488 sec
RG                       63.11
DW                      20.800 usec
DE                       6.50 usec
TE                      295.7 K
D1                   2.00000000 sec
d11                  0.03000000 sec
DELTA                1.89999998 sec
TD0                          1
SFO1               100.6550182 MHz
NUC1                       13C
P1                       9.80 usec
PLW1                58.00000000 W
SFO2               400.2596010 MHz
NUC2                       1H
CPDPRG[2                waltz16
PCPD2                   90.00 usec
PLW2                14.00000000 W
PLW12                0.35097000 W
PLW13                0.28428999 W

F2 - Processing parameters
SI                       32768
SF                 100.6450043 MHz
WDW                         EM
SSB          0
LB                       1.00 Hz
GB           0
PC                       1.40
```

^{1}H NMR- 1-((4-ethylphenyl)(phenylamino)methyl)azepan-2-one (**16i**)



^{1}H NMR- 1-((2-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16j**)




```
Current Data Parameters
NAME                  MAP40413
EXPNO                       32
PROCNO                       1

F2 - Acquisition Parameters
Date_               20130424
Time                    14.41
INSTRUM                 spect
PROBHD    5 mm PABBO BB/
PULPROG                 zg30
TD                     65536
SOLVENT                 DMSO
NS                         16
DS                          2
SWH                 8223.685 Hz
FIDRES              0.125483 Hz
AQ                  3.9845889 sec
RG                      35.49
DW                     60.800 usec
DE                      6.50 usec
TE                     296.0 K
D1                1.00000000 sec
TD0                         1

======== CHANNEL f1 ========
NUC1                       1H
P1                      14.25 usec
PLW1             14.00000000 W
SFO1            400.2604718 MHz

F2 - Processing parameters
SI                     65536
SF              400.2580000 MHz
WDW                        EM
SSB         0
LB                      0.30 Hz
GB          0
PC                      1.00
```

C^{13} NMR- 1-((2-chlorophenyl)(phenylamino)methyl)azepan-2-one (**16j**)